COAL AGE

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Facts About the Coal Shortage

By R. Dawson Hall

MISAPPREHENSION seems to have arisen in regard to the coal shortage, and relative to the attitude of the coal operators thereto. The public has heard that the National Coal Association, Dr. H. A. Garfield, former fuel administrator, and C. E. Lesher, statistician for the United States Geological Survey, have declared there is a coal shortage in prospect and that everybody should lay in his coal now. Yet the public finds that when some of the people, who use anthracite, go to buy coal they have to wait their turn, for hard coal is not being produced as fast as it is being sold.

They conclude, therefore, quite naturally, that the three aforesaid parties are engaged in a conspiracy to cause a stampede and raise the price of coal. They cannot understand—who could?—why there is any need to press the buying of coal when the producer is unable for months at a time to supply what is ordered. Now, as a matter of fact the old-line anthracite companies are not urging anyone to buy coal. They were doing so most vigorously a few months ago, when the mines were working part time, but not now. The National Coal Association, which is the body that has been predicting the shortage, does not include any anthracite operators, and its interests lie not in the sale of anthracite but of bituminous coal. The anthracite operators should not be blamed for the failure of the public, natural enough in its way, to differentiate between the association and the representatives of the anthracite industry.

The anthracite operators believe that if the public is stampeded, prices for hard coal will go up, and the independent operator who puts up his price whenever the demand permits will get the benefit. The small retailer may do the same. The old-line companies will keep their prices at the announced circular, while the independents and retailers will reap the harvest. The small boys will have rung the bell of higher prices and skipped out, and the offenseless but less nimble old-line company will remain to face the ire of the householder.

Consequently, the big anthracite corporations are keeping quiet about a possible domestic anthracite shortage, which may or may not occur, but which, if it is to come, no amount of publicity at this hour can possibly avert. However, the talk about coal shortage is helping the anthracite operators to get rid of their steam sizes of hard coal which, until lately, have been in such small demand that they had to be stocked.

The bituminous coal market is in a different condition. The best of steam coal is hard to get, though the mines that produce that grade are working steadily. The public is showing a wonderful discrimination. It requires that its coal give a large number of thermal units per pound of fuel. Unfortunately, there are big states and sections of states that do not produce coal of high thermal value. This is not a matter of coal preparation; it is a matter of natural coal quality. The coal may have little ash and a small percentage of pyrite, but it may still be an inferior coal because it has too much volatile matter.

It is necessary that this coal of inferior heat-giving quality—the coal of western Kentucky, Illinois, Indiana and Iowa—be mined if the needed amount of coal is to be produced yearly. These coal-producing areas and some others are not now as busy as they should be. This fact has exercised all those who know anything about the coal industry. If they do not get to work soon the shortage will be of almost unexampled severity. Even if they do work full time there will be a shortage, for stocks are low, men are scarce and growing scarcer, due to the migration to Europe, while railroad cars are in short supply and apt to become still harder to obtain.

The Railroad Administration has restricted the number of man-shifts a month that may be expended in car repairs. Consequently, the long lines of cars seen along the sidetracks will not represent transportation possibilities unless the Administration soon modifies its restrictive rules and permits these cars to be repaired.

For these reasons, a shortage of bituminous coal is to be expected. Already the best of bituminous steam coals cannot be bought on the open market. The whole output of these grades of bituminous coal has been contracted for. Soon the inferior grades of soft coal will be in like demand, but till they are it is best to publish the prospective shortage broadcast, for in so doing the demand is stimulated and the shortage made less severe.

The work of mining a year's supply of coal cannot be done by the miners in a month, any more than the work of reaching Chicago can be done by the Broadway Limited in two hours unless the engineers at the throttle have kept that flyer steadily pounding the rails in the eighteen hours prior thereto.

Selection of an Electric System*

By Terrell Croft
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SYNOPSIS — *Formulas and examples of their application as applied to the electrical problems incident to mine installations are here given. It is highly important for the management to know just what results to expect before electrical installation begins.*

A THREE-WIRE, 125-250-volt, direct-current system for mine service is illustrated diagrammatically in Fig. 1. A pressure of 250 volts is obtained from outside conductors for power and mine-locomotive service. The lighting feeders are operated three-wire 125-250 volts, while the lighting branches are two-wire 125 volts. This system provides a pressure of 250 volts for power and one of 125 volts across the lamps. It should be understood that a pressure of 125 volts (more or less) is more economical and satisfactory for incandescent lighting than a higher or lower voltage. A three-wire generator may be used as shown, one machine satisfying the requirements for both lighting and power.

Substations are used in mining practice where it is necessary to convert alternating current to direct current or where it is necessary to step down a high alternating transmission voltage to a low alternating distribution voltage. Where it is necessary merely to lower an alternating voltage, then only transformers are required at the substation, which may, where the

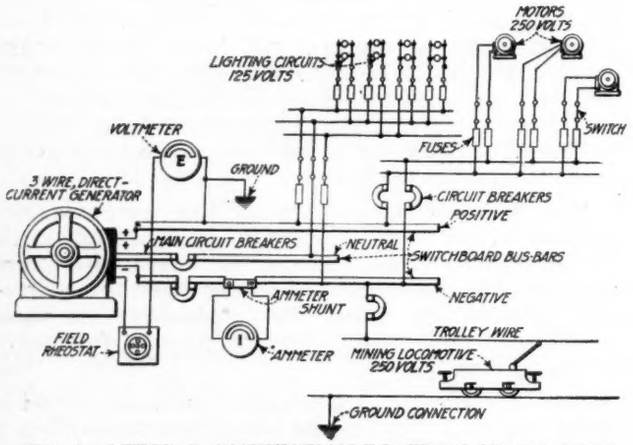

FIG. 1. TYPICAL CONNECTION DIAGRAM 125-250 VOLT DIRECT-CURRENT SYSTEM

power handled is small, comprise merely a transformer on a pole. Where the power handled is considerable, a more elaborate transformer substation may be required. It may consist of a building to house the transformers and of suitable lightning protection and switching equipment and a switchboard to carry the metering instruments. Outdoor substations, which may be for large amounts of power and high voltages, are frequently used now. For converting alternating to direct current, a substation containing a motor-generator or a converter with its transformers is necessary.

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Underground substations are often desirable economically where the workings cover a considerable area. They comprise an underground room which should, preferably, be lined with cement or brick and should be roofed to render it clean and dry. Such substations should be located as near as is feasible to the center of the then existing underground load. The high-tension alternating-current feeders supplying the station comprise suitably armored and insulated cables which may be carried in the shafts, entries or tunnels or down specially prepared boreholes from the surface direct to

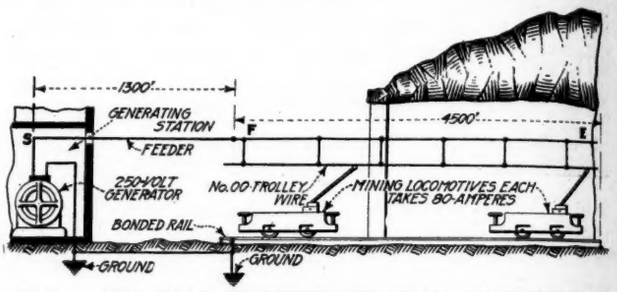

FIG. 2. EXAMPLE IN DETERMINATION OF ELECTRIC HAULAGE CONDUCTORS

the substation location. In underground substations, a good construction is to support the wiring on suitable insulators carried on a pipe framework near the ceiling of the station room. Usually it is not desirable to carry conductors in conduits in the floor of an underground substation.

A switchboard for a typical motor-generator mine substation is shown diagrammatically in Fig. 3. This shows a surface substation equipment. It does not, however, differ essentially from that which would be used in an underground substation except that the ordinary underground installation would have fewer panels.

The three requirements which any conductor for the transmission or distribution of electrical energy should satisfy may be stated thus: The wire should be selected of such a size (a) *that it will convey the electrical energy to the location where it is to be utilized without an excessive loss in potential, that is, without excessive* $I \times R$ *voltage drop;* (b) *that the current will not heat it to a temperature which will injure the insulation of the wire or originate a fire, and* (c) *that the cost due to the power loss* (*the* $I^2 \times R$ *watts loss*) *in the wire caused by the current being forced through the resistance will not be excessive.* A conductor may satisfy one of these three conditions and not satisfy the other two. Hence, as a general proposition, it is always desirable to examine the conductor size selected for any given condition from the three different standpoints outlined above.

The safe current-carrying capacity of wires should also be considered when designing circuits. A conductor may have ample cross-sectional area and convey current a given distance with a sufficiently small drop in voltage but yet may be so small that it will overheat. After a wire has been selected with reference to voltage drop, the National Electrical Code safe current-carrying-capacity table (Table I) should be consulted. If the wire first selected is not large enough to safely

TABLE I. CURRENT-CARRYING CAPACITY OF BARE COPPER CONDUCTORS USED IN MINES

(Bureau of Mines Technical Paper No. 138, "Suggested Safety Rules for Installing and Using Electrical Equipment in Bituminous Coal Mines," by H. H. Clark and C. M. Means)

Size of Conductor, B. & S. Gage	Current Capacity, Amperes	Size of Conductor, Circular Mills	Current Capacity, Amperes	Size of Conductor, Circular Mills	Current Capacity, Amperes
10	80	250,000	690	750,000	1,520
8	105	300,000	790	800,000	1,590
6	145	350,000	880	850,000	1,660
4	210	400,000	965	900,000	1,730
2	280	450,000	1,050	950,000	1,800
1	320	500,000	1,140	1,000,000	1,870
0	375	550,000	1,215	.....	.....
00	335	600,000	1,285	.....	.....
000	525	650,000	1,370	.....	.....
0000	615	700,000	1,450	.....	.....

carry the current in accordance with the value specified by the code table, a wire which is, on this basis, large enough should be used. Bureau of Standards Circular No. 23, "Standardization of Electrical Practice in Mines," states: "The table of carrying capacities of the National Electrical Code should be followed where practicable."

The allowable voltage drop in circuits is usually taken as about from 1 to 3 per cent. for incandescent lighting circuits and from 5 to 10 per cent. for motor circuits. That is, on a 110-volt incandescent lighting circuit the allowable drop should not exceed 3 volts, while on a 220-volt motor circuit the allowable drop should not exceed 22 volts.

The power loss in any circuit, either alternating or direct current, may, assuming that 11 ohms is the resistance of a circular mil foot of copper conductor, be computed by using one of the following formulas:

For any conductor

(1) $$P = 11 \times I^2 \times L/circ.mils \quad \text{(watts)}$$

Wherein

P = Power loss in conductor in watts;
I^2 = Current in amperes in conductor;
L = Length of conductor in feet;
Circ.mils = Area of conductor in circ.mils.

For a two-wire circuit, direct-current or single-phase alternating,

(2) $$P = 22 \times I^2 \times L/circ.mils \quad \text{(watts)}$$

For a three-wire, three-phase circuit, assuming balanced current,

(3) $$P = 33 \times I^2 \times L/circ.mils \quad \text{(watts)}$$

P = Power in watts lost in circuit;
I = Current in amperes which flows in each of the wires of the circuit;
L = Length (one way) of circuit;
Circ.mils = Cross-sectional area of each of the wires in circ.mils.

The foregoing formulas can be used only when all of the wires of the line are of the same size.

The calculation of a two-wire, direct-current circuit is effected by means of the following formula:

(4) $$Circ.mils = 22 \times I \times L/V$$

Wherein

V = Allowable drop in circuit;
I = Current in amperes which will flow in circuit;
L = Length one way or single distance to load center of circuit, in feet;
Circ.mils = Cross-sectional area of the conductor in circ.mils.

Example—If it is required to transmit 25 hp. 2000 ft. with a voltage of 250 at the generator and 220 at the motor, the current required $= I = (25 \times 746) \div 220 = 85$ amp. Then, circ.mils $= (22 \times 85 \times 2000) \div 30 = 124{,}700$. Two naught or 3/0 wire is indicated. With 00 wire, having a resistance of 0.078 ohm per 100 ft. or 0.312 ohm for the line, the drop in voltage will be $0.312 \times 85 = 26.5$ volts.

Calculations of three-wire, direct-current circuits are made with the formula which is used for computing two-wire, direct-current circuits. In a balanced three-wire circuit no current flows in the neutral wire. In making wiring calculations in practice for three-wire circuits, it is assumed that the circuit is balanced. Ascertain the current that will flow in the outside wires of the three-wire circuit and then use the two-wire, direct-current formula. The drop in voltage V in the formula is the drop in both the outside wires and is twice the drop between the receivers connected between the neutral and the outside wire. Obviously V can be twice as great for a three-wire circuit as for the equivalent two-wire circuit. The neutral wire, if unfused, should be the same size as each of the outside wires in order to conform to National Electrical Code requirements. But if properly fused it may be smaller. If

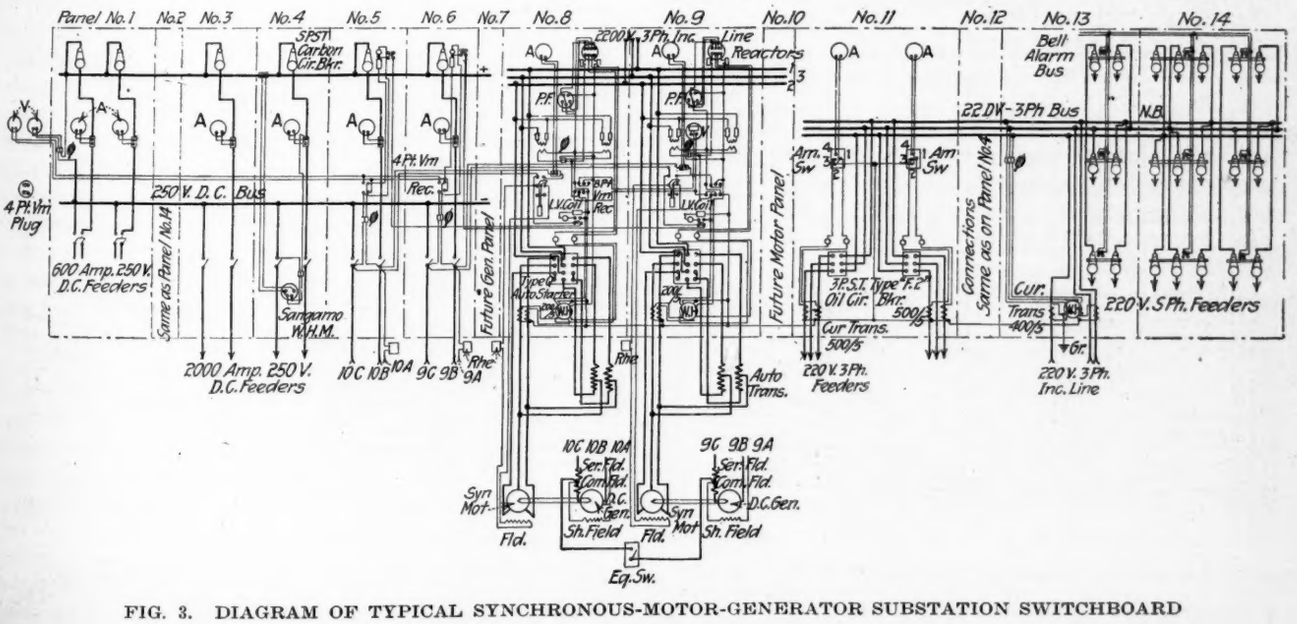

FIG. 3. DIAGRAM OF TYPICAL SYNCHRONOUS-MOTOR-GENERATOR SUBSTATION SWITCHBOARD

the neutral is permanently grounded no fuse is permitted in it, in which case it must be the same size as the outers. Grounding of the neutral is required by the National Code except for private plants where the pressure does not exceed 550 volts. This is, however, usually desirable in any case.

The allowable voltage drop in trolley-wire-and-feeder circuits is usually taken at from 15 to 20 per cent., while 25 per cent. may be permissible. A 50 per cent. drop might be allowed when the loaded trip is being accelerated from one of the farthest entries which is not used frequently. There are, however, mines where the voltage drop is over 75 to 80 per cent. when loaded trips are being started from the inside parting. Such conditions represent extremely poor practice. Such drops of potential are doubtless responsible for more trouble due to burnouts of motors and control equipment than any other condition around a mine.

The current required by the locomotives to take a trip up a certain grade is independent of the voltage on the trolley wire. This means that the same current is required to take a trip up a grade with 50 volts on the trolley wire as would be required if 250 volts were available. However, the effect of the low voltage is to reduce the speed so that the time required to ascend a certain grade is much longer with the reduced voltage. It results in excessive overheating of the motors. It not only reduces their life, but may cause frequent burnouts.

In estimating the current required by mining locomotives it is usually sufficient to base computations on 60 per cent. of the total current to be used, assuming that all of the receivers are developing simultaneously their rated outputs. That is, a demand factor of 60 per cent. is assumed. The average mine locomotive, when operated at between 20 and 25 per cent. adhesion on a 250-volt circuit with the motors in parallel, requires about 30 amp. per ton for gathering locomotives and about 25 amp. per ton for main-haulage locomotives. When operated on a 500-volt circuit, the current taken will be one-half as great.

The resistance of steel rails varies with the chemical composition of the steel. Sulphur-manganese content, particularly manganese, tends to change the resistance materially. The resistance of the steel rail will vary from about 8 to 15 times that of a copper section of the same area and at the same temperature. That is, the "rail to copper ratio" varies between 8:1 and 15:1. For the steel rails used in mine haulage the ratio is about 12:1.

To calculate the equivalent circular mils of copper corresponding to any given weight of rail in pounds per yard for any rail to copper ratio, multiply the weight of the rail in pounds per yard by the constant corresponding to this ratio as determined by the composition of the steel. Such constants are given in Table V. In another table (Table IV) presented herewith these equivalents have been computed for rails of different weights and for different "rail to copper ratios."[1]

The distance L in the trolley-wire formulas is the actual distance to the load, if the load is concentrated at one point. If, as would be the case where a number of locomotives are shifting along the track, the load is uniformly distributed, then L would be taken as equal to one-half the length of the line.

In computing the wire size required for trolley and feeder, where the steel-rail return circuit conditions are not definitely known, it may be assumed that the track-return resistance is equal to the trolley resistance. This is the most economical condition (Ohio Brass Co.) for the transmission of power using the track return. Table

[1]The area of a steel rail in square inches is equal to about one-tenth of the weight in pounds per yard. Hence, since the rails are designated by the weight in pounds per yard, the approximate area can be calculated readily. The resistance of steel rails, including the ordinary bonding that exists in mines, is about 12½ times as great as the same area of copper. A square inch of copper contains 1,270,000 circ.mils. From this it is evident that a square inch of steel rail in a mine will have approximately the same resistance as a section of copper having an area of 100,000 circ.mils. Then to find the equivalent copper section of any weight of rail it is only necessary to add together the areas of the two rails and allow 100,000 circ.mil copper for each square inch section. The result, although approximate, will be sufficiently accurate for practical computations. In other words, the copper equivalent of a steel rail in circular mils is approximately ten thousand times its weight in pounds per yard on the basis of a 12 : 1 ratio.

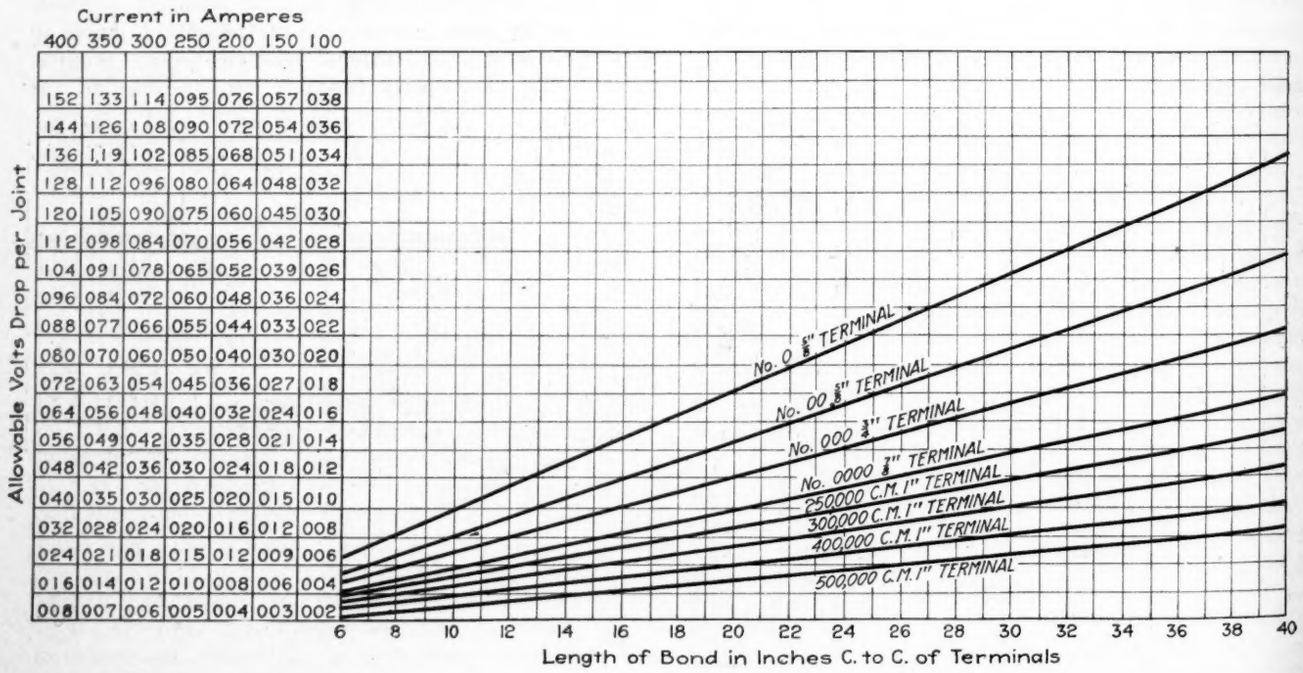

FIG. 4. GRAPH FOR FINDING LENGTH AND SIZE OF RAIL BOND REQUIRED TO PROVIDE A GIVEN VOLTAGE DROP PER JOINT (OHIO BRASS COMPANY)

TABLE II. VOLTAGE DROP IN TROLLEY WIRES, FEEDERS AND TRACK
(Ohio Brass Co.)

Two-wire system; 250-volts at mine entrance; track resistance equal to trolley-wire and feeder resistance; 100 amp. in circuit.

Distance in Mine in Feet	Volts Loss — One 4-0 Trolley Only	Volts Loss — One 4-0 Trolley and One 4-0 Feeder	Volts Loss — One 4-0 Trolley and Two 4-0 Feeders	Volts Between Track and Trolley — One 4-0 Trolley Only	Volts Between Track and Trolley — One 4-0 Trolley and One 4-0 Feeder	Volts Between Track and Trolley — One 4-0 Trolley and Two 4-0 Feeders
1,000	10	5	3	240	245	247
2,000	19	10	6	231	240	244
3,000	29	14	10	221	236	240
4,000	39	19	13	211	231	237
5,000	49	24	16	201	226	234
6,000	59	29	20	191	221	230
7,000	68	34	23	182	216	227
8,000	78	39	26	172	211	224
9,000	88	44	29	162	206	221
10,000	98	49	33	152	201	217
12,000	117	59	39	133	191	211
15,000	146	73	49	104	177	201

II is based on this assumption. In computing, the formula $Circ.mils = 22 \times L \times I/V$ can be used.

Example—What size of feeder should be used for the haulage installation diagrammed in Fig. 2? The trolley wire is No. 00 copper and the length of track to be served is 4500 ft. The distance from the generating station to the nearest end of the track is 1300 ft. The trolley wire will be fed from the feeder at equidistantly spaced locations. Two mine locomotives, each of which requires a current of 80 amp., are to be operated. The total allowable drop is 10 per cent. of the receiver voltage. *Solution*—Allowable drop is $0.10 \times 250 = 25$ volts. The total current is $80 + 80 = 160$ amp. The load center would be taken as one-half of 4500, or 2250 ft. from the feeding end of the track. Hence, the distance L for substitution in the equation will be: 1300 ft. + 2250 ft. = 3550 ft. Then substituting in the equation, thus:

(5) $Circ.mils = 22 \times L \times I/V = 22 \times 3550 \times 160/25 = 499{,}840$

Therefore, theoretically a 499,840-circ-mil cable should be used from S to F. From F to the end of the run E a smaller cable can be employed because the No. 00 trolley wire, which has an area of 133,200 circ.mils, is connected in parallel with the feeder. Therefore, the feeder from F to E should, theoretically, have an area of 499,840 — 133,200 = 366,640 circ.mils. In practice a 500,000-circ.mil feeder would, probably, be used from S to F and a 400,000 circ.-mil cable from F to E. The conductor sizes in this problem work out rather large because the distances involved are relatively great. Furthermore, a drop of only 10 per cent. has been assumed. In practice, a No. 0000 trolley wire would be used instead of the No. 00 wire shown and the size of the feeder from F to E would then be decreased accordingly.

To find voltage loss at any other current divide current in amperes by 100 and multiply the result by the voltage loss in the table.

Example—What will be the voltage between the trolley wire and the track at a point 3000 ft. from the mine entrance in a mine where there are installed a 4-0 trolley and one 4-0 feeder. Current is 500 amp.; track resistance is assumed to equal trolley-wire-and-feeder resistance. *Solution*—Volts loss with 4-0 trolley and 4-0 feeder at 3000 ft. = 14 volts, 500 amp. ÷ 100 = 5; $5 \times 14 = 70$ = volts loss. 250 volts at mine entrance — 70 volts loss = 180 volts between trolley and track.

To find loss in a mine using 3-0 trolley or feeder, multiply voltage loss in Table II by 1.261. To find loss in mine using 2-0 trolley or feeder, multiply voltage loss in Table II by 1.587.

Example—What will be the voltage in a mine using 3-0 trolley and two 3-0 feeders, at a point 5000 ft. from the mine entrance, the current being 100 amp. *Solution*—Look in Table II and find under "One 4-0 Trolley and Two 4-0 Feeders" and opposite 5000 ft. the loss to be 16 volts. Multiply 16 by 1.261, which gives 20 volts. 250 volts — 20 volts = 230 volts.[2]

An empirical formula sometimes used for computing trolley-and-feeder-wire sizes is:

(6) $Circ.mils = 14 \times L \times I/V$ (circ.mils)

Wherein

$Circ.mils$ = Area in circ.mils of conductor required;
L = Single distance in feet; that is, length of line from supply point to load center;
V = Allowable drop in volts.

This formula is based on the assumption that the rails and ground make contact at places. The rail-return circuit may have a very low resistance. The constant "14" is used instead of the usual constant "11" to allow something for track resistance.

In computing the wire size for trolley and feeder where the steel-rail conditions are definitely known the first step is to compute the voltage drop which will occur in the rails with the assumed load current flowing. Allow the remainder of the permissible drop for the feeder and trolley combined. Then compute with the formula $Circ.mils = 11 \times L \times I/V$ the area required for combined feeder and trolley. Now from the area thus obtained, subtract the cross-section of the trolley to obtain the circular-mil cross-section of the feeder.

Example—What size trolley wire should be used for a ten-ton locomotive for a main-haulage system where the distance from the substation (which is located at the mouth of the mine) to the parting is 2000 ft. and 40-lb. rails are used. The voltage is 250. *Solution*—The copper equivalent is taken from Table IV for a 40-lb. rail as 424,000 circ.mils on the basis of a 12:1 ratio. Then the equivalent copper section of two rails is $2 \times 424{,}000 = 848{,}000$. The current at full load on the basis of 10 amp. per ton is 350 amp. Assuming a maximum drop of 20 per cent. it is $0.20 \times 250 = 50$ volts. Now first ascertain the drop in the rails, thus:

(7) $V = (11 \times D \times I)/circ.mils = (11 \times 2000 \times 350)/848{,}000 = 9.1$ *volts*

[2] To find current taken by a 250-volt motor, multiply the horsepower by 3. To find current taken by a 500-volt motor, multiply the horsepower by 1½.

TABLE III. AREAS AND RESISTANCES OF STEEL RAILS IN OHMS AT 75 DEG. F., NO JOINTS

Weight of Rail, Lb. per Yd.	Actual Area, Sq.In.	Actual Area, Circ. Mils	Resistance per Mile — 8 to 1 Ratio	Resistance per Mile — 12 to 1 Ratio	Resistance per 1000 Ft. — 8 to 1 Ratio	Resistance per 1000 Ft. — 12 to 1 Ratio
16	1.57	1,986,200	0.2223	0.3345	0.0421	0.0634
20	1.96	2,494,700	0.1799	0.2683	0.0341	0.0508
25	2.45	3,119,300	0.1447	0.2150	0.0274	0.0407
30	2.94	3,743,300	0.1208	0.1789	0.0228	0.0338
35	3.43	4,367,200	0.1018	0.1513	0.0193	0.0268
40	3.92	4,978,300	0.0912	0.1340	0.0173	0.0254
45	4.42	5,627,700	0.0792	0.1191	0.0150	0.0226
50	4.90	6,238,800	0.0714	0.1071	0.0135	0.0203
60	5.88	7,486,600	0.01596	0.0892	0.0113	0.0169
70	6.86	8,734,400	0.01511	0.0766	0.0097	0.0145
75	7.35	9,230,900	0.01478	0.0719	0.0091	0.0136
80	7.84	9,982,100	0.0447	0.0670	0.0085	0.0127
90	8.82	11,229,900	0.0398	0.0596	0.0075	0.0113
100	9.80	12,477,700	0.0375	0.0537	0.0071	0.0111

(This table is based on General Electric Co. data. The values are for a mile or a thousand feet of single continuous rail. They are not for a mile or a thousand feet of track.)

Therefore, the balance of the allowable drop which will occur in the trolley wire is 50 — 9.1 = 40.9 volts. Then the area of the trolley wire will be:

(8) *Circ.mils* = (11 × *D* × *I*)/*V* = (11 × 2000 × 350)/40.9 = 188,000 *circ.mils.*

This area lies between No. 000 and No. 0000 wire. But since a gathering locomotive will probably operate from the parting, the trolley wire should be No. 0000 (211,500 circ.mils) and no feeder will be required.

The following table (from the General Electric Co.) gives the copper-equivalent areas, in circular mils, of steel rails of various weights and resistivities; that is, of various weights and "rail to copper ratios." The ratio varies from about 8:1 to 15:1. For steel rails used in mine haulage the ratio is about 12:1.

TABLE IV. CIRCULAR MILS COPPER-EQUIVALENTS OF STEEL RAILS

Weight of Rail, Lb. per Yd.	Ratio of Resistance of Steel to Resistance of Copper					
	8 to 1	10 to 1	12 to 1	13 to 1	14 to 1	15 to 1
12	190,988	152,850	127,323	117,529	109,134	101,858
16	254,646	209,925	169,764	156,706	145,512	135,811
20	318,308	254,805	212,206	195,882	181,890	169,764
25	398,886	318,595	265,257	244,853	227,363	212,206
30	477,463	382,515	318,309	293,823	272,836	254,647
35	557,040	445,735	371,360	342,794	318,308	297,088
40	636,618	509,910	424,412	391,764	363,780	339,528
45	716,196	572,930	477,463	440,735	409,253	381,968
50	795,773	636,618	530,515	489,705	454,725	424,410
60	954,928	763,942	636,618	587,646	545,670	509,292
70	1,114,083	891,260	742,721	685,587	636,615	594,174
75	1,193,660	954,927	795,773	734,558	682,087	636,615
80	1,273,238	1,018,589	848,825	783,528	727,560	697,056
90	1,432,393	1,145,913	954,928	881,469	818,505	763,938
100	1,591,546	1,273,236	1,061,030	979,410	909,450	848,820

The area in square inches of the cross-section of a rail is approximately one-tenth of its weight in pounds per yard, and its copper equivalent in circ.mils is approximately 10,000 times its weight in pounds per yard at the 12:1 ratio.

To obtain the circular mil copper equivalent of any steel rail, multiply its weight, in pounds per yard, by the proper constant in the following table. Select the constant to correspond to the "rail to copper ratio" of the steel rail in question.

TABLE V. CONSTANTS FOR COMPUTING CIRCULAR MIL COPPER EQUIVALENTS OF STEEL RAILS

Rail to Copper Ratio	Constant	Rail to Copper Ratio	Constant
8	15,900	12	10,600
9	14,130	13	9,800
10	12,740	14	9,090
11	11,580	15	8,490

The ampere capacity given in Table VI is the maximum current that the bond will carry continuously without showing an appreciable rise in temperature when the bond is installed on the rail where it will be exposed to the air. If concealed by joint plate, only a slight increase in temperature will be shown as concealed bonds are usually of short length and the heat will be dissipated rapidly through the terminals into the rail. Load currents of two or three times the values given can be carried for short periods without injurious heating (General Electric Co.).

TABLE VI. RESISTANCE OF BONDS IN OHMS AND SAFE CARRYING CAPACITY IN AMPERES

Size of Conductor	Diameter of Terminal in Inches	Resistance per Inch of Conductor at 75 Deg. F.	Ampere Cpacity
1/0	⅝	0.00000829	210
2/0	⅝	0.00000657	265
3/0	⅝	0.00000521	335
4/0	⅝	0.00000414	425
250,000 cm.	⅝	0.00000350	500
300,000 cm.	1	0.00000275	600
350,000 cm.	1	0.00000250	700
400,000 cm.	1	0.00000219	800
450,000 cm.	1	0.00000196	900
500,000 cm.	1	0.00000175	1,000

One method of computing the proper size rail bond is that suggested by the Ohio Brass Co. The following example indicates its application.

Example—What size bond should be used in a mine having a haulage 3000 ft. long and using 30-ft., 30-lb. rails? The voltage is 250; the maximum current 300 amp. and the total allowable loss is about 15 per cent. *Solution*—The allowable loss is: 0.15 × 250 = 37.5 or say 38 volts. Allowing one-half of this in the track and one-half in the trolley, the allowable loss in each is 19 volts. The resistance of 3000 ft. of 30-lb. rail on the basis of a 12:1 ratio is (see Table III): 0.0338 × 3 = 0.101 ohm. Since there are two rails in parallel the total resistance of 3000 ft. of track will be 0.101 ÷ 2 = 0.051 ohm. The voltage drop then in the 3000 ft. of track will be 0.051 ohm × 300 amp. = 15.3 volts. That is, the drop in both rails, assuming that they were continuous and without joints, would be 15 volts. Hence, the allowable loss in the joints is 19 — 15 = 4 volts. Since there are 100 joints, the allowable loss per joint is 0.04 volts. Since 300 amp. is to flow in the track the current in each rail will be 150 amp. Now, in the graph of Fig. 4 under the column headed "150 amp." the nearest value to 0.04 volts is 0.039. Following this horizontally it is found that this corresponds to a 30-in. No. 0 ⅜-in. terminal bond or a 38-in. No. 00 ⅜-in. bond. So any bond of this size and length or shorter is satisfactory for the joint. If the bond is to be carried around the fishplate, a longer one may be required. A shorter one will suffice when it is to be placed under the fishplate. If in the foregoing case the length of haulage had been 3500 ft., the drop in the continuous track would have been 17.1 volts and in the bonds 1.9 volts. The drop per joint would be 1.9 ÷ 100 = 0.019 per joint. Under column headed "150 amp." 0.018 volts is the closest value. Following across horizontally it is found that any one of the following bonds will be satisfactory: 13 in. No. 0, ⅜ in.; 16 in. No. 00, ⅜ in.; 20-in. No. 000, ⅜ in.; 26 in. No. 0000, ⅜ in. In any case the shortest length feasible should be selected.

To calculate single-phase, alternating-current circuits where line reactance may be neglected the following formulas can be safely used in determining branch-circuit sizes and also for feeders and mains where the conductors are carried in conduit or are not long. Where the conductors are of considerable length the result given by the formula should be checked with the Mershon diagram (Fig. 5). The current may be found from this equation:

(9) $I = kw. \times 1000/E \times p.f.$ (amperes)

Wherein

I = Current in amperes in a single-phase circuit;
Kw. = Kilowatts input of load;
E = Voltage of circuit;
p.f. = Power factor of load.

To compute the wire size use the formula:

(10) $Circ.mils = 22 \times L \times I / V$

Wherein all symbols have the same meanings as given above.

Example—Find the size of feeder to transmit 300 amp. with 15 per cent. allowable drop in voltage on a 250-volt circuit with a total distance of 3000 ft. from power

TABLE VII. FOR CALCULATING DROP IN ALTERNATING-CURRENT LINES WITH THE MERSHON DIAGRAM OF FIG. 5
[1]60 CYCLES

Size of Wire (Circ. Mils) and B. & S. Gage	Safe Carrying Capacity, N. E. C. Rubber In.	Safe Carrying Capacity, N. E. C. Other In.	Resistance-volts in 1000 Ft. of Line (2000 Ft. of Wire) for 1 Amp. (The Values in This Column Are Really the Resistances of 2000 Ft. of Conductor at 75 Deg. F.)	Reactance-volts in 1000 ft. of line (2000 ft. of wire) for 1 amp. at 7200 alternations per minute (60 cycles per second) for the distance given in inches between centers of conductors. (The values in these columns are really the reactances of 2000 ft. of conductor)													
				½	1	2	3	4	5	6	8	9	12	18	24	30	36	48	96
14– 4,107	15	20	5.06	0.138	0.178	0.218	0.220	0.233	0.244	0.252	.....	0.271	0.284	0.302	.....	.....	.....	.....	.....
12– 6,530	20	25	3.18	0.127	0.159	0.190	0.210	0.223	0.233	0.241	.....	0.260	0.273	0.292	.....	.....	.....	.....	.....
10– 10,803	25	30	2.00	0.116	0.148	0.180	0.199	0.212	0.223	0.221	0.244	0.249	0.262	0.281	.....	.....	.....	0.326	0.358
8– 16,510	35	50	1.26	0.106	0.138	0.169	0.188	0.201	0.212	0.220	0.233	0.238	0.252	0.270	0.284	0.293	0.302	0.315	0.347
6– 26,250	50	70	0.790	0.095	0.127	0.158	0.178	0.190	0.210	0.209	0.222	0.228	0.241	0.260	0.272	0.283	0.291	0.305	0.337
4– 41,740	70	90	0.498	0.085	0.117	0.149	0.176	0.180	0.190	0.199	0.211	0.217	0.230	0.249	0.262	0.272	0.281	0.294	0.326
2– 66,370	90	125	0.312	0.074	0.106	0.138	0.156	0.169	0.180	0.188	0.194	0.206	0.220	0.238	0.252	0.262	0.270	0.277	0.309
1– 83,690	100	150	0.248	0.068	0.101	0.132	0.151	0.164	0.174	0.183	0.190	0.201	0.214	0.233	0.246	0.256	0.265	0.273	0.305
0–105,500	125	200	0.196	0.063	0.095	0.127	0.145	0.159	0.169	0.177	0.184	0.196	0.209	0.228	0.241	0.251	0.259	0.267	0.299
2/0–133,100	150	225	0.156	0.057	0.090	0.121	0.140	0.153	0.164	0.172	0.179	0.190	0.204	0.222	0.236	0.246	0.254	0.262	0.294
3/0–167,800	175	275	0.122	0.052	0.085	0.116	0.135	0.148	0.158	0.167	0.173	0.185	0.199	0.217	0.230	0.241	0.249	0.255	0.287
4/0–211,600	225	325	0.098	0.046	0.079	0.111	0.130	0.143	0.153	0.161	0.168	0.180	0.193	0.212	0.225	0.235	0.244	0.251	0.283
250,000	235	250	0.085	.....	0.075	0.106	0.125	0.139	0.148	0.157	0.164	0.175	0.189	0.207	0.220	.....	.....	.....	.....
300,000	275	400	0.075	.....	0.071	0.103	0.120	0.134	0.144	0.153	0.160	0.171	0.185	0.203	0.217	.....	.....	0.242	0.274
350,000	300	450	0.061	.....	0.067	0.099	0.118	0.128	0.141	0.149	0.157	0.168	0.182	0.200	0.213	.....	.....	.....	.....
400,000	325	500	0.052	.....	0.064	0.096	0.114	0.127	0.138	0.146	0.154	0.165	0.178	0.197	0.209	.....	.....	0.237	0.269
500,000	400	600	0.042	.....	.....	0.090	0.109	0.122	0.133	0.141	0.148	0.160	0.172	0.192	0.202	.....	.....	0.231	0.263
600,000	450	680	0.035	.....	.....	0.087	0.106	0.118	0.128	0.137	0.144	0.155	0.169	0.187	0.200	.....	.....	0.226	0.258
700,000	500	760	0.030	.....	.....	0.083	0.102	0.114	0.125	0.133	0.141	0.152	0.165	0.184	0.197	.....	.....	0.223	0.255
800,000	550	840	0.026	.....	.....	0.080	0.099	0.112	0.122	0.130	0.138	0.148	0.162	0.181	0.194	.....	.....	0.220	0.252
900,000	600	920	0.024	.....	.....	0.077	0.096	0.109	0.119	0.127	0.135	0.146	0.159	0.178	0.191	.....	.....	0.218	0.250
1,000,000	650	1,000	0.022	.....	.....	0.075	0.094	0.106	0.117	0.125	0.132	0.144	0.158	0.176	0.188	.....	.....	0.215	0.247

[1] For other frequencies the reactance will be in direct proportion to the frequency.

house to center of distribution. *Solution*—The allowable voltage drop is $0.15 \times 250 = 37.5$. Then substitute in the equation: $Circ.mils = 22 \times L \times I/V = 22 \times 3000 \times 300/37.5 = 528{,}000$ *circ.mils*. The nearest standard size to 528,000 circ.mils is 500,000, which would be used. A 500,000 circ.mil conductor with rubber insulation has a safe current-carrying capacity of 400 amp. Hence it is ample for the 300 amp. of this problem.

The calculations of a single-phase branch which feeds from a three-phase circuit are made in the same way as are those for any other single-phase circuit. However, it should be recognized that if the branch is connected between one of the three phase-wires and the neutral the voltage imposed on the branch circuit will be 0.58 × the voltage across any two wires of the three-phase circuit.

To calculate a three-phase, three-wire, alternating-current circuit where line reactance can be neglected, the following formulas can be used. The limitations for this method are the same as those outlined elsewhere for single-phase circuits. As with the single-phase equation, the Mershon diagram (Fig. 5) should be used on circuits of considerable length for checking the results obtained. Where the current is not known it may be obtained with the equation:

(11) $$I_3 = Kw. \times 1000/E \times p.f. \times 1.73 = I_3 = Kw. \times 580/E \times p.f.$$ (Amperes)

Wherein I_3 = the current in each of the three wires of a balanced three-phase, three-wire circuit. The other symbols have the same significance as in the preceding formula. Then when the current is known compute the wire size thus:

(12) $$Circ.mils. = 11 \times I_3 \times L \times 1.73/V = Circ.mils = 19 \times I_3 \times L/V$$.

wherein the notation is the same as outlined in this and in preceding paragraphs.

How to Use the Mershon Diagram.—By means of Table VII calculate the resistance-volts and reactance-volts in the line, and find what per cent. each is of the e.m.f. delivered at the end of the line. Starting from the point on the chart (Fig. 5) where the vertical line corresponding with power factor of the load intersects the smallest circle, lay off in per cent. the resistance e.m.f. horizontally and to the right; from the point thus

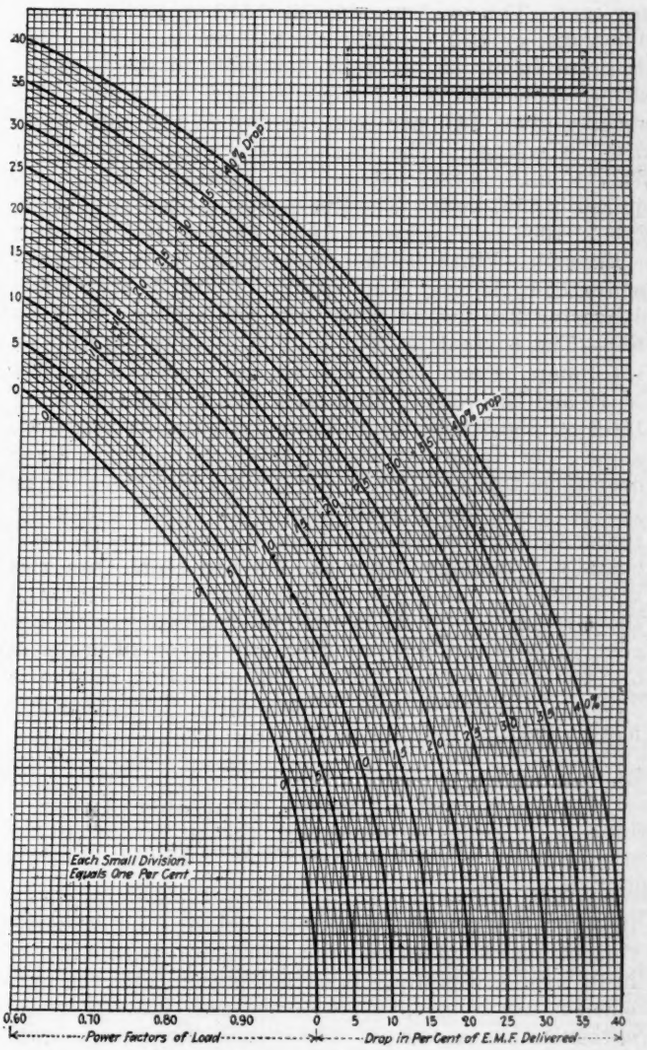

FIG. 5. THE MERSHON DIAGRAM

TABLE VIII. APPLICATION OF ALTERNATING-CURRENT LIGHTING PROTECTORS (WESTINGHOUSE ELECTRIC CO.)

General Class	Type	Max. Volts	Station Capacity	Usual Application	Remarks
Carborundum block	MP	400 750	Unlimited	Outdoors on line for protection of low-voltage motor installations	A low-priced arrester giving good protection on low-voltage circuits
Non-arcing-metal cylinder	C	1,250 2,500	200 kw. (or higher if more than 2 miles from station)	Outdoors on line and for transformer protection	Maximum protection (within limits of station capacity), possible in low-priced arresters
Non-arcing-metal cylinder with series resistance (single-pole)	CR	2,500	Unlimited	Same as type C	Similar to type C but with resistance; for use at higher station capacities. Single-pole only.
Non-arcing-metal cylinder with series resistance (double-pole)	G	2,500	Unlimited	Same as type C	Similar to type CR multiple
Cupped-disk gap	W	6,600 13,200	Unlimited	Outdoors for transformer protection	Similar to type CR but for higher voltages
Graded-shunt resistance	S	3,500 7,000 11,000 13,200	2,000 kw.	Indoors for apparatus. Outdoors for transformers	Greater protection than foregoing. A low equivalent arrester suitable for small stations or extra good protection of transformers
Graded-shunt resistance	L.E.	2,000 to 39,000	Unlimited	Same as type S	Same as type S except for larger stations and higher voltages
Electrolytic or aluminum cell	AK	2,000 to 145,500	Unlimited	Same as types S and L. E.	Maximum protection possible in present state of the art. Should be used in all cases of high voltage and at all voltages where conditions are severe or importance of protection is considered above cost

obtained lay off upward in per cent. the reactance e.m.f. The circle on which the last point falls gives the drop in per cent. of the e.m.f. delivered at the end of the line. Every tenth circle arc is marked with the per cent. drop to which it corresponds.

Example—What will be the performance of a 00 three-phase, 60-cycle line, 24-in. spacing, 63,000 ft. long when delivering 500 kw. at 5737 volts and 85 p.f.? *Solution*—Voltage to neutral each wire $=5740 \div 1.73 = 3317$. Current per wire $= 500 \times 1000 \div 3 \times 3317 \times 0.85 = 59.1$ amp. The resistance drop is $0.078 \times 58.1 \times 63 = 290$ volts, or $290 \div 3316 = 8.7$ per cent. The reactance drop is $0.118 \times 59.1 \times 63 = 439$ volts, or $439 \div 3317 = 13.2$ per cent. On the diagram follow 85 per cent. vertically to the 0 curve, thence horizontally 8.7 squares and vertically 13.2 squares gives 14.5 per cent., or say 15 per cent. total drop in voltage. The total voltage drop indicated is $5737 \times 0.15 = 860$ volts and the generator voltage required is 6597 volts. The line power loss is $3 \times 59.1 \times 290 \times 1000 = 51.4$ kw. $= 51.4 \div 500 = 10.3$ per cent.

Example—What is the performance of a 0 single-phase, 60-cycle line, 18-in. spacing, 10,000 ft. long when delivering 250 kw. at 2000 volts and 0.80 p.f.? *Solution*—The current is $250 \times 1000 \div 2000 \times 0.80 = 156.2$ amp. From Table VII the line reactance is 0.228×10 and the voltage drop from this is $0.228 \times 10 \times 156.2 = 356.3$ volts or 17.8 per cent. due to reactance alone. The line resistance is 0.196×10 and the voltage drop from this is $0.196 \times 10 \times 156.2 = 306.3$ volts or 15.2 per cent. due to resistance alone. On the diagram follow 0.80 p.f. vertically to the 0 curve then 90 horizontally a distance equal to 15.3 per cent., then rise vertically a distance corresponding to 17.8 per cent. and the circular arc of 23 is reached, indicating a 23 per cent. drop in terms of receiver voltage, or 23 per cent. of 2000 volts = 460 volts. The generator voltage is 2460 and the line drop is 18.7 per cent. The line power loss $= 306.3 \times 156.2 \div 1000 = 47.9$ kw.

Co-operation Between Byproduct Coke Ovens and Gas Works

Serious problems, claiming the attention of many in Great Britain who deal with fuel, are the conservation of coal supplies and the economical production of heat, light and power. It cannot be said that the most efficient use is being made of the gas obtained by the carbonization of coal in coke ovens. The future development of the coking industry will probably be in two main directions: (1) Coke-oven plants will become large heat, light and power producers, or (2) large centers of chemical activity.

Notwithstanding extravagant claims of electrical engineers, the best and most economical way of treating coal for the production of heat, light and power is by carbonizing the coal and subsequently recovering gas, coke and byproducts in the modern byproduct coke oven. And just as the byproduct coke oven is the ideal carbonizing system, so also it should be agreed that existing gas works are the best and most efficient distribution agencies. There should be the closest coöperation between the gas and the coke industries. The universal use of coke-oven gas (recommended by gas authorities) could be advised only where the circumstances of geographical position, availability of supply and the necessity of gas works (as an extension to carbonizing plants) justified its serious consideration.

Experience has demonstrated that coke-oven gas can be made as suitable as any retort gas for any purpose whatever. There should not be any fear that a suitable illuminating power could not be maintained. The greatest difficulty might be, perhaps, the difficulty of maintaining a constant supply. It has been considered that the possibility of miners' strikes might effectuallly prevent any extension of the use of coke-oven gas; but it should be remembered that gas works themselves are liable to that disability. It is a question of stocks, and the same remedy is available to both.

Coal gas at present offers the best and most economical medium for the supply of energy in the form of heat, light and power. To maintain that power in the future, gas must be supplied at the lowest possible price. Those gas companies favorably situated in the vicinity of coking plants and able to procure a supply of suitable gas therefrom are provided with a means of crushing electrical competition for many years to come. There is no question but that, generally speaking, coke-oven proprietors can afford and are willing to sell their surplus gas at a much lower figure than any gas works would consider; in many cases it can be bought for less than half what it costs to produce it in a gas works. On the Continent and in America, coke-oven gas has been carried distances of 100 miles, so that there should be no hesitation in accepting contracts up to 50 miles.

Any considerable extension in the use of coke-oven gas in the direction indicated would almost render unnecessary the great central power and heat distributing centers of which so much is heard and which would entail an enormous outlay to develop.

Depletion and Depreciation of Coal-Mining Properties*

By D. C. Burdick
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SYNOPSIS—*Much attention has recently been given to depletion and depreciation charges against coal operation. An equitable distribution is sometimes difficult to secure, but charges should be graduated and of such an amount that the total investment may be extinguished when the property is worked out.*

THE subject of depreciation of coal properties has probably received more attention and discussion in the last two years than ever before in the history of coal mining. This subject has been brought to the attention of the operator, more especially the small operator, through regulation of prices by the United States Fuel Administration during the war. We may well consider this as one of the benefits of the war, as it has brought to attention the great necessity of properly accounting the cost of a ton of coal mined and loaded on a railroad car for shipment.

Depreciation and depletion have been given small attention in the past in computation of cost simply from the fact that the operator did not sign a check in payment thereof, no thought being given as to how he was to dispose of the amount standing on his books against property plant and equipment at the time when his mine was exhausted and further income from the investment had ceased. Now the problem is, How shall we properly dispose of the property investment?

Probably the most comprehensive method of explaining my views on the subject is to theoretically invest in a coal mine and carry the depreciation and depletion through to the end of the operation. The first procedure, of course, is the purchase of the minerals, and for complete handling I shall consider that in purchasing the minerals it is also necessary to purchase the surface.

Mineral Rights and Plant Site

For example, I shall assume a tract containing 500 acres and presume the price paid to be $200 per acre for the coal and surface, presuming the surface to be average farm land and valued for this purpose at $100 per acre. On this basis the minerals will cost $100 per acre. On this acreage a plant site must be selected, which I shall assume will require 20 acres. I now arrive at the value of minerals and real estate to be depleted, by the following:

500 acres coal @ $100 per acre	$50,000
20 acres plant site @ $100 per acre	2,000
Total to be depleted	$52,000

Assuming the amount of recoverable coal from this tract to be 5000 tons per acre, we find that we have 2,500,000 tons of coal to be mined; and assuming the life of the mine or the time required to remove the coal to be 20 years, I find the average yearly output to be 125,000 tons.

I also find, by dividing the cost of the minerals and plant site by the recoverable tonnage, that it will take 2.08 cents per ton to wipe out the investment during the life of the mine. Please bear in mind this charge for depletion of minerals and plant site. This should be credited to reserve for depletion and should not be confused with depreciation of plant and equipment. The simple method of handling this depletion would be to charge 2.08 cents for every ton of coal mined during the life of the mine to the cost of the coal, crediting the proper reserve. However, it may be desirable to graduate the charge for depletion, charging a higher rate during the earlier operation of the mine when other operating costs are low on account of the accessibility of the coal to the mine opening.

Assuming the graduated method is desirable, I submit the following table of graduations, allowing the first year of operation for development:

Years Development	Mined, Tons	Depletion Rate Cents per Ton	Total Depletion
2	125,000	4.17	$5,212.50
3	125,000	3.95	4,937.50
4	125,000	3.73	4,662.50
5	135,000	3.51	4,387.50
6	125,000	3.27	4,112.50
7	125,000	3.07	3,837.50
8	125,000	2.85	3,562.50
9	125,000	2.63	3,287.50
10	125,000	2.41	3,012.50
11	125,000	2.19	2,737.50
12	125,000	1.97	2,187.50
13	125,000	1.53	1,912.50
14	125,000	1.31	1,637.50
15	125,000	1.09	1,362.50
16	125,000	.87	1,087.50
17	125,000	.65	812.50
18	125,000	.43	537.50
19	125,000	.21	262.50
20	125,000	Nothing	.....
Total			$52,012.50

The figures in this table are unverified, but they give an idea of how the graduated scale would work out. The graduating scale is arrived at approximately by doubling the average rate of depletion, using the amount thus obtained as a maximum rate; then divide this rate by the number of years of operation, exclusive of the development year, and reduce the rate each year by the amount thus obtained. In the present case the formula is: Average rate, 2.08 + cents per ton × 2 = 4.17 ÷ 19 years = 0.22, or the amount of reduction in rate each year.

This apparently takes care of the amount invested in minerals. At the beginning of this paper mention was made of the purchase of surface as well as the minerals. Assuming this surface has a marketable value of $100 per acre, we find that we have invested in this class of property, 500 acres of surface at $100 per acre = $50,000; less the 20 acres to be used for plant site at $100 per acre = $2000, leaving $48,000 invested in marketable farm land. It being assumed that this land may be rented or tilled to produce income to cover interest on the investment, therefore no depletion should be considered on this part of the investment as

*Paper presented before the Kentucky Mining Institute, Lexington, Ky., June 6, 1919.

it is assumed that the land can be sold at any time for $100 per acre.

The depreciation of plant and equipment is a more complex problem than that of depletion. There are four fundamental groupings of losses: Class A—Physical (these can be foreseen). (1) Wear and tear due to operation. (2) Those arising from the passage of time and exposure to the weather. Class B—Functional (these cannot be foreseen). (3) Obsolescence. (4) Inadequacy.

The losses falling under Class A require no explanation. Class B, Obsolesence, refers to loss of asset value due to the progress of invention, machinery being especially subject to this form of depreciation.

Inadequacy usually arises from the growth of a business. Presuming the plant and equipment necessary to mine the tract of 500 acres of coal to cost $150,000, and also presuming that the original plant and equipment and subsequent additions shall be maintained in good repair throughout the life of the mine, I would proceed to write off the original investment and subsequent additions in the following manner:

As a basis for the amount to be used for depreciation purposes charge 10 cents per ton each month for all coal mined during the month to expense and credit depreciation reserve. My reason for using a per-ton basis rather than a percentage of the value of the equipment is that it distributes the depreciation expense more evenly on the cost sheet and compensates for uneven running time. It might occur to some that buildings should receive a lower rate of depreciation than machinery and equipment on account of the usually longer life of a building. In this connection, however, it must be borne in mind that no matter what physical condition a mine building may be in at the time the coal is exhausted the building is of no further value other than salvage. This point is immaterial, however, from the fact that the operator may distribute the amount available for depreciation in any manner he sees fit.

I would suggest the plant and equipment be subdivided in a general way, say about as follows:

Mine Openings—Under this heading would be shown shafts, slopes, main entries, airways, etc.

Mine Buildings and Fixtures—Covers permanent structures.

Machinery—Covering engines, generators, pumps, boilers, etc.

Mine Equipment—Covering mining machines, motors, mine cars and the like.

Steel Rail—Covering all rail used in development of the mine and additional rail purchased during the life of the mine of 20 lb. weight or over, used in extension of main haulage roads. Rail lighter than 20 lb. per yard and commonly known as room rail, as well as all wooden rail and ties, should be charged to mine expenses as used.

Copper Wire—Covering all copper wire used in the original development of the mine and additional copper wire of 1/0 size and over purchased during life of the mine. Copper wire smaller than 1/0, as well as all fixtures for installing trolley wire and feeders, should be charged to mine expenses as used.

Live Stock—Horses, mules, etc.

Wire Ropes—Hoist and haulage ropes.

Miscellaneous Equipment—All appurtenances not covered in the foregoing.

My experience in handling short-life equipment such as live stock and wire rope is to depreciate it on a basis of probable life and charge replacements to property account and retirements, less salvage, to depreciation reserve. I have found that the average life of a mine mule is five years, therefore I charge to depreciation reserve at the rate of 20 per cent. per year on the capital invested in this class of equipment. When a loss occurs either from natural causes or accident, the value of the mule lost, less salvage, is charged to depreciation reserve and the replacement is charged to property account. In this manner the property account reflects the true value of the physical inventories of live stock.

Wire rope is handled in the same manner except due consideration should be given the life of the rope, for which there is no fixed standard, as its life is contingent on the service in which it is used; for example, a shaft rope would have considerably longer life than a rope used in a slope. There may be other items of short-life equipment which may be handled in a similar manner.

Equipment subject to obsolescence and inadequacy falling in Class B cannot be foreseen, and no special depreciation is considered. However, should the occasion demand that certain equipment be retired for reason of obsolescence or inadequacy, the value of the equipment retired, less salvage, should be charged to depreciation reserve and the replacement to property account.

I shall now proceed to distribute the original plant and equipment investment of $150,000 under the headings enumerated and carry the depreciation out for a period of one year.

Estimated tonnage mined in 12 months = 125,000 tons, and 125,000 × 10 cents per ton = $12,500, or the amount avilable for depreciation purposes.

First deducting the amount of depreciation to be set up for short-life equipment. Live stock, book value, $1500 at 20 per cent. per year = $300. Wire rope, based on five years' life as a shaft rope, book value $599 at 16⅔ per cent. per year = $100. Total available depreciation, $12,500. Less depreciation short-life equipment, $400. Leaves available $12,100 for the balance of the plant equipment to be prorated to value shown opposite each class of equipment.

Class of Equipment	Book Value	Reserve for Depreciation in One Year
Mine openings	$75,000	$6,133
Buildings and fixtures	25,000	2,043
Machinery	20,000	1,635
Equipment	13,000	1,064
Steel rail	5,000	408
Copper wire	5,000	408
Live stock	1,500	300
Wire rope	500	100
Miscellaneous equipment	5,000	409
Total	$150,000	$12,500

It will be noted from this statement that the original plant and equipment investment will be fully depreciated during a period of 12 years. This is conservative, however, as the additions to plant and equipment during the life of the mine, the obsolescence and inadequacy replacement, all of which must be taken care of, being at this time wholly unknown quantities, will no doubt necessitate the continuance of the depreciation reserve well along toward the exhaustion of the mine. If, however, conditions are such in later years that the rate of depreciation may be reduced, it no doubt would be a

happy state of affairs for the operator since it would come at a time when his other operating costs were high on account of accessible coal being a long distance from the mine opening.

Up to this point it will be noted no mention or allowances have been made for salvage at the time the mine is worked out and abandoned. There is no doubt that a considerable salvage will be realized and it may be the desire of some to consider this.

As a conservative allowance for salvage I would rate steel rail, trolley wire and brass, trolley equipment and other copper wire at 50 per cent. of their original cost and all other shipments at 10 per cent. However, in the case of trolley wire and steel rails, inasmuch as additions to this class of equipment are charged to property account up to the last period of operation, a considerable portion of the salvage value may be required to entirely clear the books of the capital investment.

Investment in commissary and dwellings, from which a rental is received, should be handled under the head of real estate, and depreciation on this class of property should be charged to the real estate department expenses. No earnings or expenses in connection with this department should be considered in computation of the cost of coal.

In concluding this paper I might say that the object I had in mind in its preparation was to express my ideas in as few words as possible with no thought for technical terms, but to create discussion in order to bring out the views of others.

Low-Sulphur Coal in Illinois*

By Gilbert H. Cady
Illinois State Geological Survey, Urbana, Illinois

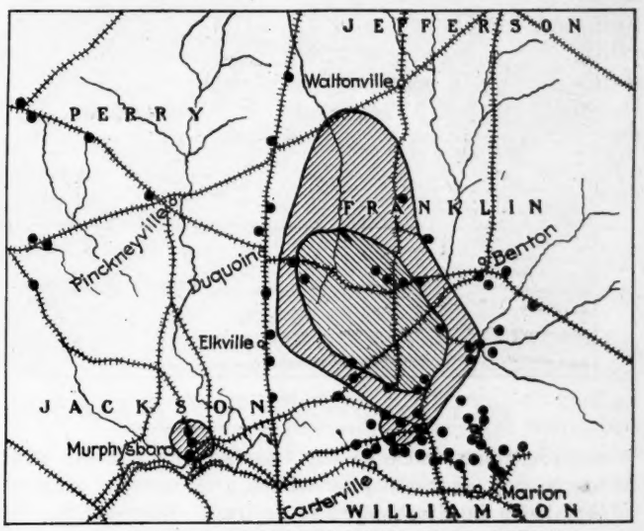
Extensive sampling of coal in Illinois during the past 10 or 12 years by the State Geological Survey, in coöperation with various organizations, such as the U. S. Bureau of Mines, the University of Illinois and the Illinois Coöperative Mining Investigations, has made possible the delineation of two areas of low-sulphur coal in the southern part of Illinois. The sulphur content is less than 1.25 per cent., so that if otherwise suitable these coals can be employed for metallurgical uses and for the manufacture of water-gas and retort gas. One of these areas is small and lies in Jackson County, near Murphysboro, the other is much larger and includes a large port of the famous Franklin County field.

A small area of No. 2, or Murphysboro, coal has been worked for many years near the town of Murphysboro, Jackson County, Illinois. In two mines, at least, the coal has a sulphur content of less than 1.25 per cent. It is doubtful, however, whether this field will ever be a source of large tonnage as the total area underlain by low-sulphur coal in workable thickness is probably less than 15 square miles (24.14 sq.km.), and a large part of it has already been worked out.

The location of the area of low-sulphur coal in the Franklin County field is shown in the accompanying map. The small area underlain by the Murphysboro low-sulphur coal is shown near the town of that name in the central part of Jackson County. The larger area lies in the west side of Franklin County, extending also about 6 miles (9.65 km.) south into Williamson County, about 4 miles (6.43 km.) west into northern Jackson and western Perry County, and northward an undetermined distance into Jefferson County. All but the northern limit of the area is fairly well defined by sampling in numerous mines. The inner cross-lined area is underlain by coal having less than 1 per cent. sulphur, the outer boundary surrounding the area underlain by coal having less than 1.25 per cent. sulphur.

The coal mined in the district is No. 6 or Herrin coal, commonly known as the Carterville or Franklin County coal. The bed has a thickness varying from about 8 ft. (2.4 m.) on the border of the low sulphur area up to more than 10 ft. (3 m.) in the general portion, locally having a thickness of 14 to 15 ft. (4.2 to 4.5 m.). The sulphur content, in general, decreases as the thickness of the coal increases.

Another peculiarity is the variation in the character of the roof that accompanies the variation in thickness. Near and beyond the border of the low-sulphur area there is a limestone cap-rock within about 25 ft. (7.6 m.) of the bed, but in the central part of the area the cap-rock is either absent or at a much greater height above the coal.[1] This relationship between the roof rock, the thickness of the coal, and the amount of sulphur present seems to hold consistently throughout the field. There is also a decrease in the interval between No. 6 and No. 5 coals and an increase in the interval between No. 6 and No. 9 coals operating geographically across Franklin County field the same as the decrease in the sulphur content. These stratigraphic variations accompanying the chemical variation make it possible to estimate roughly the character of the coal even from drill records and to determine the approximate extension of the low-sulphur field in areas not yet mined.



LOCATION OF LOW-SULPHUR COAL AREAS

*Paper to be presented at the Chicago meeting of the American Institute of Mining Engineers, in September, 1919.

[1]G. H. Cady, Coal Resources of District VI: Illinois Coal Mining Investigations *Bulletin* 15, pp. 29-47, 1916.

A Rapid Unloading Machine

Machine Described Is Intended for Rapid Unloading of Granular Bulk Materials from a Ship's Hold and Finds Its Application in the Handling of Coal for Export and Bunkering

THE automatic unloader shown in the accompanying illustrations is intended for handling coal, ore and similar granular bulk material. It is built by the Wellman-Seaver-Morgan Co. of Cleveland, Ohio. Unique in design, it has proved to be one of the most successful devices for unloading cargoes from lake steamers that have ever been devised. Although of large proportions, the design has been simplified and the control perfected to such a point that the machine is the last word in delicacy of control and operation.

The unloader consists of a main framework mounted on trucks which travel along the runway rails located approximately as shown in Fig. 1. The main framework extends back to the rear of the runway over a temporary storage pile where the ore or other material can be discharged if desired. Between the front and rear runway space is provided for railroad tracks whereon cars are placed under the machines and loaded.

The girders of the main framework form a support for runway rails, on which a trolley travels. This trolley supports a balanced walking beam, from the outer end of which a stiff bucket leg depends. At the lower end of this leg is the bucket, which is operated by machinery located on the walking beam. All horizontal movements of the bucket are accomplished by means of moving the trolley backward and forward on the girders. The vertical movements of the bucket are accomplished by the operation of the walking beam. The forward portion of the beam being out of balance, the bucket descends by gravity as soon as the brakes of the hoisting mechanism are released.

The hoisting mechanism controlling this operation is located in the inclosed house at the rear end of the walking beam. Ropes from the winding drums of this mechanism pass around sheaves located in the rear end of the trolley and are anchored to the rear end of the walking beam.

In addition to the main parts of the machine which have been described there is also a receiving hopper located at the forward end of the main framework and between the main girders, provided for the purpose of receiving the material discharged from the bucket. The capacity of this hopper is about three full bucket loads, and its purpose is to act as a balancing point or temporary storage between the bucket and the cars or stockpile as the case may be. The bottom of the hopper is provided with outlet gates and the contents discharged as required into a larry, which runs on an auxiliary track suspended from the under side of the main girders.

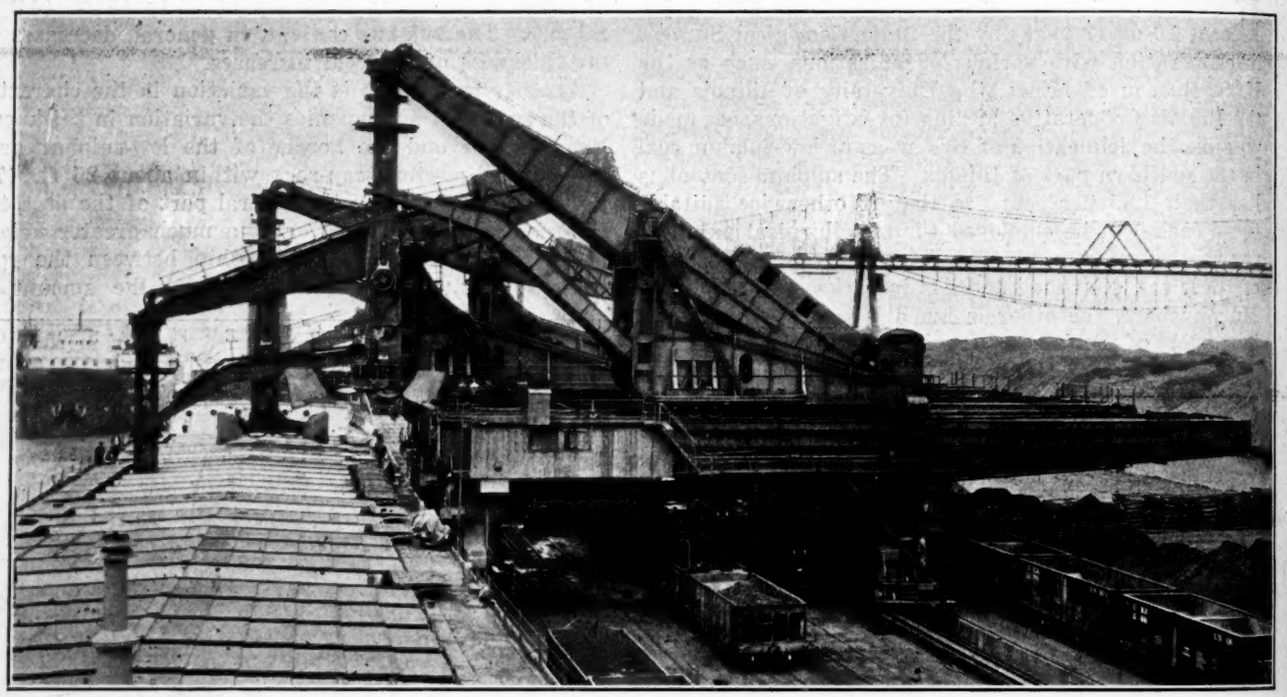


FIG. 1. UNLOADERS AT THE DOCKS OF THE UNITED STATES STEEL CORPORATION, CONNEAUT, OHIO

The larry, after receiving its load from the main hopper, moves to a point such that its contents can be discharged either into the cars standing on the railroad tracks beneath the main span of the girders or into a temporary storage pile under the cantilever at the rear of the machines. The material so placed in this temporary stockpile cannot be reclaimed by means of these machines as their function is solely one of unloading the cargo from the ships.

Machines of this type have been made in two sizes, the smaller having a capacity of 10 tons and the larger size (such as is shown in Fig. 1) having a capacity of

17 tons in the bucket shells. The machine shown is electrically operated throughout and its speeds are regulated so as to operate through a complete cycle in about 50 seconds.

Some idea of the capacities of unloading attained by this method may be derived from a record which was made in Ashtabula by eight machines of this type having a capacity of 15 tons each, unloading seven boats having a total capacity of 70,000 tons in 22 hours actual time. At other points four machines working in boats having capacities up to 13,000 tons have unloaded these cargoes in about 3 hours, 25 minutes.

The operation of the machine is as follows: After the boat has been placed alongside the dock, the machine is moved opposite one of the hatches and the bucket is lowered through the hatch into the hold. After filling the bucket, the walking beam hoist mechanism is put in operation and the bucket hoisted out of the boat. At the same time the trolley is traversed backward so that the bucket is brought over the main hopper between the girders in the main framework, and its contents discharged into this hopper. The bucket is then immediately returned to the boat for another load.

The material in the main hopper is discharged into the larry, which has been brought to a point directly underneath the discharge gates of the hopper. The larry hopper is filled and the larry is moved to the desired discharge point and the gates are opened, discharging the hopper contents as required. The larry hopper is provided with scales so that the contents may be accurately weighed and recorded. In this way a car can be loaded to its allowable capacity and an accurate record kept of the amount of material so loaded, thus eliminating the necessity for the use of track scales.

If railroad cars are not available for immediate shipment, the larry is traversed to a position on the rear cantilever and its contents discharged into a temporary storage pile. From here the coal or ore is usually reclaimed for shipment or storage by means of a bridge located on the runway at the rear of the unloader.

Only two operators are required for the entire operation of one of these machines. One of the operators, whose station is in the bucket leg directly over the bucket shells, controls all of the motions of raising and lowering the bucket, of traversing the trolley back and forth, and moving the machine along the dock from one hatch to another. The second operator is stationed in a cab on the larry and from this station he controls the movement of the larry, the operation of its discharge gates, and the weighing of the material.

The bucket shells are each made of a single piece of plate formed to proper shape. These bucket shells are usually provided with manganese steel cutting lips so as to resist abrasion. The bucket shells themselves are carried on heavy cast steel arms mounted on rollers traveling in guides in the fixed portion of the lower end of the bucket leg. The position of the operator who controls the movements of the bucket, etc., as previously described is shown in Fig. 2. The view shows the bucket in operation in the hold of a modern ore carrier after most of the cargo has been removed and the balance has been scraped into position so as to be handled by the bucket.

The motor for operating as well as for closing the bucket is located in the machinery house at the back of the walking beam. Ropes from this bucket-closing mechanism are carried through the walking beam and the bucket leg and attached to a power drum directly over the operator. This power drum is geared to the closing chain drums, one of which is shown in Fig. 2. The bucket is opened by reversing the motor and the bucket shells are forced open by means of an opening chain located in the center of the bucket leg between the two closing chains.

In addition to the vertical movement, which is given to the bucket leg by means of the walking beam, it also has a motion of rotation around its vertical axis. This is accomplished by means of ropes attached to a segment on the bucket leg itself, the ropes being carried back in the walking beam to a rotating mechanism which is located adjacent to the bucket-closing mechanism. The bucket leg itself is carried on a roller bearing which is attached to the top end of the leg. This motion is introduced for the purpose of turning the bucket at right angles to the hatchway in order to secure as great a reach lengthwise of the boat as possible; thus the bucket is enabled to reach out under the hatches and

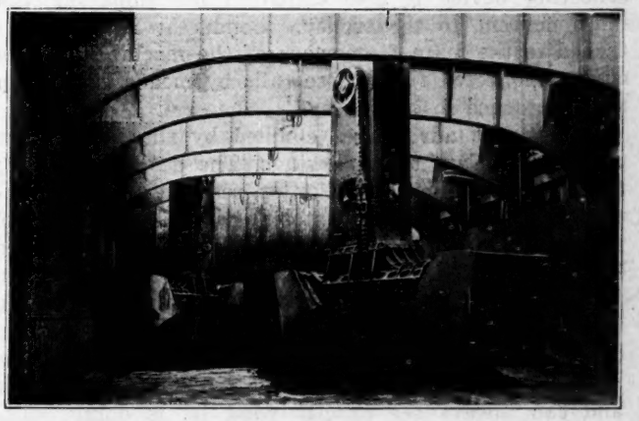


FIG. 2. UNLOADER LEG AND BUCKET AT WORK IN HOLD OF A MODERN BOAT

The leg is so mounted in the walking beam that it can rotate in a circle, allowing the bucket to reach out in all directions. These machines have often unloaded 97 per cent. of a cargo without the help of shovelers. The position of the operator who controls the movements of the bucket is shown above. The distance from point to point of the bucket shell when open is 21 feet.

remove ore which is not directly beneath the hatch opening. The distance from point to point of the bucket shells when open is approximately 21 feet.

The scale larry, into which the main hopper discharges, has a capacity of between 35 and 45 tons, and two larry loads are intended to constitute a full carload of ore. The discharge gates of the larry are suspended from the sides of the larry frame and operated by connecting rods which attach to cranks, also connected to the main larry frame. These gates are operated by means of a small motor which is carried at the rear of the larry. The gates are so arranged that all or a portion of the contents of the larry may be discharged. The hopper is suspended in the larry frame on scales so that its contents may be wholly or partially discharged and its weight be accurately recorded.

The mechanism for moving the larry back and forth on its track consists of winding drums upon which ropes are wound, the end of the rope being attached to the rear end of the cantilever on the main framework. The track is inclined and the larry is pulled up the incline by means of these ropes and descends by gravity.

As previously stated, these machines are usually electrically operated throughout. In some cases, however, machines of the same general type have been made to operate by steam and hydraulic cylinders, water being

supplied by means of a steam accumulator at a pressure of 1000 lb. per square inch.

The electrically operated machines are usually designed for 220-volt direct current. Alternating current is never used. The motors required for the equipment of one of these machines are as follows: Beam hoist, one 275-hp. motor; bucket closing, one 120-hp. motor; bucket rotating, one 25-hp. motor; trolley travel, one 120-hp. motor; hopper gates, one 100-hp. motor; longitudinal travel, one 100-hp. motor; larry travel, one 150-hp. motor; larry gates, one 40-hp. motor. The control equipment for these motors is of the magnetic switch type throughout, having master controllers in the operators' cabs in the bucket leg and on the larry.

Electric current is supplied to these machines by means of insulated conductor rails running the length of the main runways. The current is collected from these rails by means of pick-up shoes and distributed to the various portions of the machine. A similar collecting device is also employed for supplying the main current to the trolley. Conductor rails are attached to the main framework of the machine and the current collected from these rails by means of pick-up shoes attached to the trolley.

Among the advantages claimed by the makers for this machine are the following: The design is heavy; there is little to get out of order, resulting in low maintenance cost per ton of material handled. The control is accurate and positive, and manual labor is reduced to a minimum. The bucket is positively guided in passing through the hatches of ships, thus eliminating the danger of damage either to the boat or to the machines, arising from the use of rope-suspended buckets.

The operator travels with the bucket into the boat and can always see exactly what he is doing. The bucket is of large capacity, but is so suspended from the walking beam that the weight resting on the tank top of a boat is less than one-third of the weight of a rope-suspended bucket of equal capacity.

One particularly important consideration to be reckoned with is the extremely low cost obtainable with these machines. Records extending over long periods show unloading cost ranging from 2½ to 4½ cents per ton. This includes superintendence, labor, repairs and supplies on the machines, as well as the expense for power and light.

On account of the extreme reach of the bucket, it is possible for a machine of this type to discharge a much higher percentage of a ship's cargo than can be accomplished by ordinary rope-operated buckets. The bucket can be rotated at right angles to the hatch and reach out for ore which would be entirely inaccessible to an ordinary bucket. This unloader is not a combination machine. It is an unloader, pure and simple, and it does its work well.

IT IS OFTEN an advantage about a plant to have concrete harden quickly. The Bureau of Standards has developed a method whereby the rate at which concrete increases in strength with age is accelerated by the addition of small quantities of calcium chloride to the mixing water. Tests show that the best results are obtained when from 4 to 6 per cent. of this material—by weight—is added. While no deleterious effects on the durability of plain concrete thus treated have been indicated, on the other hand we are warned against the unrestricted use of this salt in reinforced concrete. Corrosion of ordinary reinforcing takes place in concrete treated with calcium chloride, where this concrete is exposed to weather or water.

Legal Department

NEGLIGENCE MUST CAUSE ACCIDENT TO BE ACTIONABLE—Even if defendant's mine foreman negligently directed plaintiff, a miner, to work on the right side of his room, that would not render defendant liable for injury to plaintiff disconnected with such order, and resulting from plaintiff's own act in mining coal almost across the face of his room, leaving a projection which he caused to fall by mining coal under it. (Texas Court of Civil Appeals, Haney vs. Texas & Pacific Coal Co., 207 Southwestern Reporter, 375.)

KANSAS WORKMAN'S COMPENSATION ACT—Under the Kansas Workmen's Compensation Act, a miner who was ruptured while attempting to remove a rock which fell upon a fellow workman was not debarred to recover compensation for his suffering and diminished earning capacity merely because the injury was not so serious as to totally disable him for the first two weeks following the accident, nor because he can continue to earn as much as before the accident by undergoing pain and relying upon the friendly help of his fellow workmen. (Kansas Supreme Court, Raffaghelle vs. Russell, 176 Pacific Reporter, 640.)

CONTRIBUTORY NEGLIGENCE OF INJURED EMPLOYEE—Upon a derailment of cars in a mine, plaintiff, a triprider, refused to assist in replacing them on the track, and went to sleep at a point between the cars. A car went wild on an adjoining track, and some co-employee, evidently supposing that the car was on the track where plaintiff lay, called to him to "Look out." Plaintiff sprang from his position to the adjoining track and was injured by the car. Held, that he could not recover from the company on the theory that he had been negligently placed in peril. (Alabama Supreme Court, Sanders vs. Alabama Co., 80 Southern Reporter, 360.)

INJURY TO CONVICT LABORER IN MINE—Where a prisoner in the custody of the State of Alabama was required to work in defendant's mine under some sort of an arrangement between the state and the company, the latter became liable for any injury to the convict directly attributable to negligence on the part of the company. But conscious violation of an established rule of the company designed to secure his and other workers' safety would preclude recovery of damages for his death, if resulting directly from such violation. On the other hand, a rule too impractical to be executed, or one habitually violated to the knowledge of the operator, is a nullity. These rules were lately laid down by the Alabama Supreme Court in a case in which a father sued for death of a minor struck by a tramcar while he was walking along a slope. (Murchison vs. Red Feather Coal Co., 80 Southern Reporter, 354.)

FORMATION OF COAL SALES CONTRACT—After negotiations for a sale of coal from plaintiff to defendant, plaintiff sent a formal contract to defendant in duplicate for execution. In neither the negotiations nor the contract was it stated whether the coal should be screened or mine run. Defendant signed the written contracts and returned one copy to plaintiff, but with a letter stating that it was defendant's understanding that screened coal would be delivered. Plaintiff promptly replied that the quotation was on run of mine coal, and requested statement whether the contract was accepted as written or not. Defendant did not reply. Under these circumstances it is held by the Georgia Court of Appeals in the case of South Atlantic Coal Co. vs. National Rosin Oil and Size Co., 97 Southeastern Reporter, 559, that there was no binding contract for a sale; the minds of the parties never having met on the particular kind of coal to be delivered under the proposed contract. The copy of the contract defendant returned to plaintiff signed must be read together with the accompanying letter, which constituted as much a part of the terms to which defendant agreed as if they had been stated in the proposed contract.

Gas Ignition at Alderson (Okla.) Mine Kills Fifteen Men

On Monday morning, June 30, an explosion occurred at Alderson, Okla., in the No. 5 mine of the Rock Island Coal and Mining Co. The gas ignition did not occur when the men were entering the mine, but at 11:15 a.m., when they had already been working for some length of time. It is interesting to note that no such ignition, unaccompanied by a violent explosion, has ever occurred before in the Oklahoma field. The explosion caused apparently the formation of a large amount of carbon monoxide, for none of the men who were killed struggled more than 15 yd. away from where they had been working. Some doubtless died from inhaling the flames. Several did not even move out of their working chambers, yet none of them were bruised by concussion, the ignition being of such a quiet nature that it could not in any real sense be termed an explosion. It did little or no damage to the walls or the roof of the mine. Another interesting matter was the marked localization of the ignition. It appears to have been confined to the area where standing gas existed.

The sweep of flame occurred on the third entry east, off the east slope, 4000 ft. away from the main shaft. Three theories are advanced as to the origin of the gas. One is that a mining machine cut into a "feeder." However, if it had, the men would have noticed the "bleed" long enough to warn them before the gas had escaped in sufficient quantity to cause a flare of such dimensions, as it attained, and the place would have shown traces of gas the following day. At least, that is the conclusion of State Mine Inspector Ed. Boyle. Another theory is that gas accumulated in the longwall working adjacent to slope No. 2. This is 68 ft. long and 15 ft. high. A third theory is that when a hole was bored from room 45, a tight room, to room 46, another tight room, and with the air none too good, the mixture exploded.

Some of the men were burned severely about their hands and faces, while several had no burns whatever. The rescue force of the United States Bureau of Mines at McAlester, which is under the direction of W. W. Fleming, was at the scene of action within half an hour after notification. The last body was brought to the surface shortly after 6 o'clock. T. O. Oglesby, resident mine superintendent. William Jones, mine superintendent, and Dr. O. W. Rice of Alderson took active part in recovering the bodies.

The investigating committee composed not only Chief Inspector Boyle, but J. J. Rutledge, the mining engineer of the United States Bureau of Mines in the Oklahoma district, Tom Scott, assistant state inspector for district No. 1; W. T. Williams, assistant state inspector for district No. 2, and Miller D. Hay, assistant inspector for district No. 3.

The men killed were: William Burns, American, 42, married; Andrew Braski, Pole, 39, married; Joe Volloc, American, 17, single; John Passetti, Italian, 42, single; John Bolden, Negro, 38, married; William Grisley, Lithuanian, 35, married, nine in family; Steve Kincaid, American, 41, single; Elmer "Babe" Booth, American, 25, single; Anstasio Soriano, Mexican, married; William Sherwood, American, 30, married; John Patrick, American, 40, single; John Cannon, American, 38, married; C. Harreral, Mexican, 37, married; Florentino Romirez, Mexican, 35, married; J. P. Roy, Negro, married.

"Babe" Booth, the only one found living, was brought to the bottom of the main shaft and later to the surface. He died at 11 p.m. on Monday, without regaining consciousness. Examination showed one lung burned away. With his death went all chance of explanation of the accident. There were 167 men working in the mine at the time of the disaster.

Gas Explosion at Carswell, W. Va.

Investigation shows that the explosion at the Carswell mine of the Houston Collieries Co., Carswell, near Kimball, McDowell County, W. Va., was confined to an extremely small area, where the air was charged with methane. The explosion occurred between 7 and 8 o'clock on Friday morning, July 18. There was a report in circulation that at least 30 miners had been killed and many others injured. There were only 50 men at work at the time of the explosion, and all but six of those in the mine when the explosion occurred were soon accounted for.

A rescue party was organized and succeeded in penetrating to the remote part of the mine in which the explosion happened. Five of the six bodies were recovered early in the afternoon, and the sixth body before nightfall. While the explosion was limited to the one room, in which the men were working, it was, of course, felt in all other parts of the mine, though it inflicted no injuries and did no damage at any other points in the workings.

The theory was first advanced and has since been confirmed by the Chief of the Department of Mines, W. J. Heatherman, that the explosion was caused by a local accumulation of gas in the room where the six men were working. The men who were killed as a result of this explosion are: M. T. Roberts, mine foreman, John Teens, John Tollay, Charles Chapman, Elbert Smith and Richard Kennedy, all miners, the last two named being colored men.

While the Carswell mine has a capacity of about 500 tons of coal a day and employs as many as 200 men when working at full strength, only 50 men were actually employed at the time of the accident. The Carswell mine is approached by a shaft and is one of the few mines of that character in the Pocahontas district. It operates in the No. 4 seam of the Pocahontas series.

This same mine was the scene of an explosion on May 27, 1916, when four men were instantly killed in an explosion at the face of the first entry, caused by a door being left open. The air current was thus diverted permitting methane to accumulate.

Advise Use of Plain Concrete

Some consulting engineers are advising the use of plain concrete in cases where reinforcing can as well be eliminated as not. Cases have been cited in recent bridge construction, for example, in which reinforcing was specified, where the bulk of such work could have been built without steel. The idea was expressed that a difference in design would have made the steel entirely unnecessary. Steel was during the war in such demand for essential war purposes that its conservative use in other lines, than bridgework, was often suggested. May there not be instances in concrete work about coal mines where steel could be omitted?

Quack Analyses

New Scheme Resorted to by Unscrupulous Coal Men to Boost Sale of Inferior Coal—Benefits of a Government Coal Inspection Bureau

By N. H. Seaburg
Boston, Mass.

Every upright citizen who has not only his own personal safety, but also that of the community, at heart sympathizes and supports to the best of his ability the war upon the quack medical practitioner wherever found. and it is the same in every profession or trade where quackery of one kind or another attaches itself barnacle-like to a sound and necessary activity in the world's economic structure.

Quackery is a persistent evil and, like weeds in a garden, must forever be kept after. It chokes and stunts the healthy growth of any industry or profession, besides bringing it into bad repute. While the most popular illustration of the undesirability and danger of quackery is in the medical profession, the countless industries of the country are also burdened with this leprous affliction. None is entirely immune, as its guises are innumerable.

Coal Industry Has Its Fakirs

The coal industry has its quacks, but up to the last few years it has managed exceedingly well in its weeding out of this deplorable element. However, since the general upheaval caused by the war, the industry has been over-run with a swarm of "get-rich-quick" enthusiasts whose sole ambition has been to make money while the sun of big profits was at the zenith. Like leeches, as soon as they have had their fill and the carcass becomes barren, they will hie themselves elsewhere unless they are compelled to do so sooner by the effective swishing of a long tail. The legitimate members of the trade should organize and put into use such a tail and keep it in continual action swatting this harmful kind of fly.

During the past several months the sledding of the quacks has been difficult, inasmuch as the buying public has refused to consider the stocking of coal at high price. Sales of coal have been confined almost exclusively to the best grade, but with the usual fertility of invention the quack found a way to circumvent this barrier. It was a simple matter. All that was necessary was to furnish the prospective customer with an alluring analysis of the coal to be delivered.

And such analyses as have been circulated! The plague has taken the form of the promotion literature which is today sweeping the country describing the opportunities in oil investments. The same flamboyant misstatements have been made, and in an equally reckless manner. The victims have been many. Curiously, too, there are those who have become firm converts to this method of buying coal. There are small consumers who never before realized what an analysis was. They had simply bought a certain kind of coal because the price was low and it burned as well as any they had purchased before. But now, since the quack has sown his seeds of misinformation, every Tom, Dick and Harry must have a coal running about 3 per cent. in ash and containing 15,000 B.t.u. Nothing else will be considered. Coals not having analyses similar to this requirement are tabooed as inferior and not worthy of notice.

While this attitude may appeal to the humor of the conversant coal man, it is far from a ridiculous situation. There is danger in it. If quacks are permitted to flood the trade with impossible and false analyses, it will not be long before they have created an impossible state of mind in the purchasing public. Unless the truth is told and the buyer convinced that he has been having a pipe-dream, there will be a demand for a grade of goods that cannot be delivered.

Honest Dealers Find Competition Hard

What opportunity and reception may a coal man with an honest analysis in his hand expect in competition with a quack? He may have one of the best coals in the country and yet the quack can always alter his analysis to suit the moment. The buyer will never know that the quack will ship a coal much inferior to that which would have been supplied by the honest coal man, as there are comparatively few buyers who resort to laboratory tests at their own expense. Of course, the quack is too canny to approach large consumers, knowing full well that he would soon be exposed. His prey is the small and less informed buyer where the chances of exposure are slight.

Every one knows how rapidly a palatable evil spreads, and the only hope of checking it lies in doing so before it has had too wide a circulation. Buying coal on the analysis basis is a somewhat new experience with most consumers today, and great danger exists in permitting the public to receive the usual infantile over-dose. Buyers do not realize that true analyses should be subjected to close study. A particularly attractive set of figures may not be suitable at all for a certain grade of work, and yet the uninformed buyer may think it represents the ideal fuel. Consumers must therefore be educated to a correct understanding of this method of buying, and the first and most essential thing to do is to protect them against the mischief of false analyses. This may be accomplished in two ways: either through individual action or through coöperation with the Government.

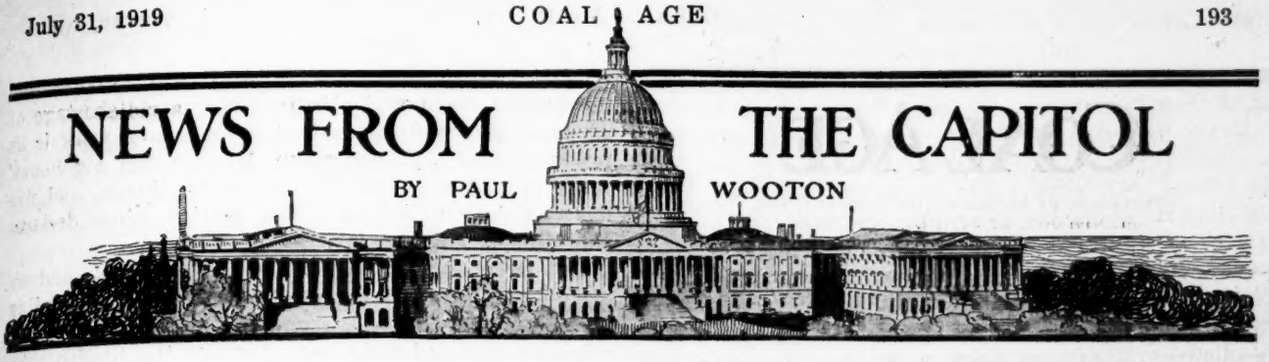
Bill Would Prevent Dishonesty

The bill which is soon to be introduced in the Senate and House providing for the establishment of a fuel inspection system through the Bureau of Mines should be thoughtfully considered. There is little doubt but that its provisions would be beneficial to the trade. There is everywhere evidence of the favor and confidence with which the consumers regard all coals classified in the present Navy standard list. The proposed bill is an extension of this system, except that the Government would certify different standards and see to it that they were maintained. The consumer would then have his choice and could depend upon securing at all times the quality of fuel that he purchased so long as the Government certified that the standard was being maintained by the mining company.

The reputable coal man who maintains a certain high standard for his coal is entitled to protection and recognition of his product. It is a distinct business asset to him, as well as an assurance to his customers of good coal. Under this Government fuel-inspection system both parties would be protected, and quack analyses would find difficult competition. In fact it is justifiable to suppose that it would mean the end of misleading analyses, a goal which all should desire.

NEWS FROM THE CAPITOL

BY PAUL WOOTON



Investigation of Coal Industry May Be Postponed for the Present

After sifting out some of the outstanding facts in the coal situation, the Committee on Rules of the House of Representatives apparently is more than willing to forego any detailed investigation of the industry. The committee recognizes that it is too late to attempt to save the situation this winter, even if there should be a situation to save. The committee also is of the opinion that if anything had been done in violation of the anti-trust laws, it is better at this time that the Department of Justice do the investigating and take such steps as are indicated by existing statutes.

While the committee apparently is of the opinion that present prices of coal are not radically out of line with the prices of other commodities, there is every reason to believe that any decided increase in prices would precipitate a complete investigation of the situation. The developments on the House side are having a bearing on the Senate probe, and it is probable that the proposed investigation will be postponed for the present.

Alleges Propaganda To Frighten Coal Users

One of the resolutions considered by the Rules Committee was that of Representative Huddleston, which alleges an organized propaganda to frighten consumers into the purchase at present prices. Mr. Huddleston is regarded by most members of the House as being extremely radical in many of his views, and no great importance is attached to his proposal. In fact, he advocates "a thoroughgoing system of price fixing, which would include not merely raw materials but all of the common necessaries of life."

The principal expert testimony given at the hearing was furnished by George H. Cushing, manager and director of the American Wholesale Coal Association, and E. W. Parker, representing the anthracite operators. Mr. Cushing attempted to show the committee that it was not possible to expect a successful combination of bituminous interests. He gave figures showing that supplies of undeveloped bituminous coal in the United States are too extensive and too widespread to permit of domination by any combination, especially when the Elkins amendment to the act to control commerce compels railroads to furnish cars and trackage. Any effort to buy up all the coal lands is made impossible by the cost of carrying them.

The committee had been told that prices of coal are now in excess of those fixed by the Fuel Administrator. Mr. Cushing gave figures showing that the greatest disparity of prices exists. In St. Louis, for instance, the same grade of coal is being sold at prices varying from $1.15 to $2.65. He showed that the railroad bids on the same grade of coal varied from $1.65 to $2.50.

Reorganization Plan of Bureau of Mines Calls for Two Main Branches

Taking advantage of the lessons in administrative organization which were taught by the war, Director Manning has put into effect a new form of organization in the Bureau of Mines. The Bureau is divided into two branches, one the investigations branch and the other the operations branch. F. G. Cottrell, who has been chief metallurgist of the Bureau, has been promoted to the position of assistant director and will be in charge of the investigations branch. F. J. Bailey, who has been chief clerk of the Bureau, has been placed in charge of the operations branch with the title of assistant to the director.

All research and technical control will be exercised through the investigations branch, while the non-technical work, administrative duties and dissemination of the results of the Bureau's activities will be handled by the operations branch.

Under the investigations branch comes the division of mineral technology, in charge of Dr. C. L. Parsons; the division of fuels, under the chief mechanical engineer, O. P. Hood; the division of mining, under the direction of George S. Rice, the chief mining engineer; the division of petroleum and natural gas, under the direction of J. O. Lewis, the chief petroleum technologist, and the division of experiment stations, under the direction of D. A. Lyon.

The operations branch has as its subdivisions the office of the chief clerk, which will be presided over by H. E. Meyer; the division of education and information, with T. T. Read in charge; government fuel yards and coal purchases, with C. S. Pope in charge; mine rescue cars and stations, with D. J. Parker in charge.

One of the important divisions is that of experiment stations. The stations under the direct charge of Mr. Lyon, with their respective directors, are as follows: Pittsburgh station, H. A. Holbrook; Urbana station, C. A. Herbert; Columbus station, R. T. Stull; Bartlesville station, W. P. Dykema; Minneapolis station. C. E. Julihn; Fairbanks station, J. A. Davis; Golden station, R. B. Moore; Salt Lake City station, Thomas Barley; Tucson station, C. E. Van Barneveld; San Francisco station, L. H. Duschak; Seattle station, F. K. Ovitz. A. E. Wells has been made assistant supervisor of stations.

F. G. Cottrell, chief metallurgist of the Bureau of Mines, will return to Washington from Europe the middle of August.

G. F. Tryon, who has been engaged in the statistical section of the General Staff during the war, has been appointed assistant to C. E. Lesher and will take charge of the compilation of certain coal statistics.

COAL AGE

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IN THE troubles of the British mine operators, and in those of Canada, we of America can not find anything in which to rejoice but rather much that we may deplore and dread. When Germany drifted toward bolshevism, the authorities of our nation pointed out the danger that this spirit of hatred, this high-handedness and peculiar admixture of covetousness and idealism, would spread to America.

Much more have we to fear that the insanities of the British workingmen will spread to the United States and wreck our prosperity in just the same way as it bids fair to destroy that of the British Isles. Much sail spread to the winds may help us in our race with Great Britain, but the wind of an unruly Trades Unionism, while it may help us for a while may ultimately wreck our own craft as well as those against which we are racing.

* * *

The treasonable thought has entered into the mind of the British mine worker that in the strike he has a weapon that is more potent than the vote. He cares not who rules the duly appointed councils of the whole nation so that he rules the labor union. He feels that a few laboring men controlling the union can so disturb the economic status of the nation as to compel the majority to cravenly submit and obey. With utter disdain the miner casts aside the ballot box. Universal suffrage is to him a despised and broken thing, for he argues that he who fills the coal bin rules the world.

He is using his power not merely to secure wage increases which he might conceivably be considered justified in thinking were his due, but to enforce nationalization of his own and other industries, to shift part of the costs of industrial production onto the taxpayer, to secure the repeal of the Military Service Bill, to prohibit the use of the military in the maintenance of order and to compel the withdrawal of troops from Siberia.

* * *

MINORITIES are, it must be conceded, often right in their contentions, but even when that is true, and it certainly is not true of the British miner, that fact does not give the minority the right to refuse in concert to perform its economic duties and thus force the majority to its knees.

Unfortunately, Premier Lloyd George and Andrew Bonar Law know of but one cure for the demands of such minorities—compromise. The bandit is to be bought off with concessions. Like all bandits, he will return as before with the hope of new and larger booty. Tribute is the prolific mother of brigandage.

And yet, strange to say, the sop thrown to the mine worker, and the one which quieted him, was, after all, money and not a political concession. The miner who works by the ton is to get more pay per unit of product on the ground that he cannot mine as many tons in seven hours as he can in eight.

STRANGE to say, in the United States, in opposition to this claim that shorter time means shortage of product, the union avers that seven hours' work is as productive as a full working day; in fact six hours' work is said to be as effective as ten hours, and five days as fruitful as six. The British miner declares that this is not so

But Great Britain is not the United States, and we are obliged to admit that there is reason for contending that in Great Britain even two hours might be as effective as a full eight-hour day, for the British mine workers only average 0.89 of a ton per day where the average mine worker in the United States produces five tons. Surely the British miner could, therefore, speed up his work, especially as it seems that the contract miner even in the United States could readily produce more coal than he is doing; and he, at the present time, is hardly averaging six hours a day.

As for the mine worker of the United States who is paid by the day, it seems unlikely that he could or would do much more per hour than he is doing, but the dataller and especially the miner in Great Britain, could easily put his meager eight hours of work into less time if he would.

* * *

THERE was no purpose, therefore, in raising the British miner's tonnage rate when shortening his time, for mines could be shown in the United States where 20 tons a day is an ordinary day's loading and where 25 tons is not unusual. In these mines no machines are in use for assisting in the work of loading the coal. In Great Britain, however, there are an immense number of such loading devices; but the spirit of endeavor is lacking or large tonnages would result.

Let us assume that the mine worker of Great Britain is appeased for a while. Even the Tripolitan pirates, in the early part of the last century, were satisfied for a season with the tribute paid them by the British and French governments. Granted the mine workers are similarly pacified, the increase in the cost of coal, larger now than ever, will unsettle prices everywhere and the mine worker and all other industrial workers will be made restless by the greater cost of what they buy. Other strikes will then follow.

* * *

BRITISH mine workers are to receive considerably more than a day's work from other workers in return for each day's work the mine workers perform. This is bound to cause discontent. The other workmen of the United Kingdom will seek to redress the balance, and when others get larger wages the mine worker will again feel aggrieved. The craven solution of the British cabinet is no solution at all. It is a further step on the long and narrow road that leads to bankruptcy. Let us hope that the British people may find a way out of it and that we may not also be compelled to travel along that difficult highway.

"Get all you can" may be all right as a matter for the individual doing business with competitive conditions. Sometimes even that right has been questioned; but it certainly is not a good principle to be followed by a trust created in restraint of trade, whether that trust be an association of manufacturers or producers or a trade union.

Western Mining Villages

A TRIP to the Rocky Mountains from Wyoming down into Arizona would reveal that what we have been pleased to call "mining camps" are in most cases places of comfort and frequently places of beauty. The energy and resourcefulness of the Westerner is not readily subdued by the aridity of the climate, and his pretty villages bear tribute to his initiative and skill.

Everywhere there are good schools, far better than are provided in the Eastern mining sections. Good schooling is having its effect on the people, the quality of any one being largely determined by the early training he receives.

Earnings being large in Western villages, the automobile craze has swept them like an epidemic. In the towns of the Colorado Fuel and Iron Co., the corporation has already provided stalls for 250 automobiles. The company is about to build 39 more stalls, but that will not house all the cars, for the demand for accommodation continually grows. These stalls are occupied by the motor cars of miners. They do not use these automobiles to go to work, for the villages are close to the shafts and slopes of the company. They are purchased solely for pleasure.

At a mine in the heart of the Rockies, one man earned last year as a miner $5800. Several others paid taxes on $4000 and must have earned, therefore, about $5000. There is no lack of comfort in these towns, with their spacious amusement halls, large comfortable bathhouses, lawns, private and public baths, bowling alleys, pool tables, classrooms, reading rooms, ladies' parlors and what not.

Above all, there is the democratic Western spirit that breathes the air of friendship into the brick and stucco walls of these institutions. When asked if the average Western mine village does not excel the ordinary mine village in the East, it is better for the Easterner to look wise and say nothing, for there is nothing wise—and at the same time truthful—that he can say.

The demand of the day is that all things shall sell for less than the cost of production. American miners want to rent houses at a loss to the landlord and buy powder and coal below the expense of producing them. British miners want still more. They would have all coal sold below cost. Wheat is already sold to them and others at a loss to the state. The slogan remains to be written, but it may well run, "Let the children feast lustily on the savings of their ancestors."

Some Dangerous Conditions

NOBODY nowadays needs to be told that carelessness is the worst enemy with which the miner has to contend. Of all the mishaps, accidents and disasters that befall mines and miners, carelessness in one form or another is responsible for the vast majority.

It would seem that such a costly disaster as that occurring in the Baltimore Tunnel early in June would forcibly direct the attention of mining men to the dangers of "fooling with" powder or of handling it roughly, no matter how substantial may be its container. Familiarity may breed contempt, but a contempt of danger is by no means synonymous with bravery. It is rather the unmistakable mark—the brand—of one form of imbecility.

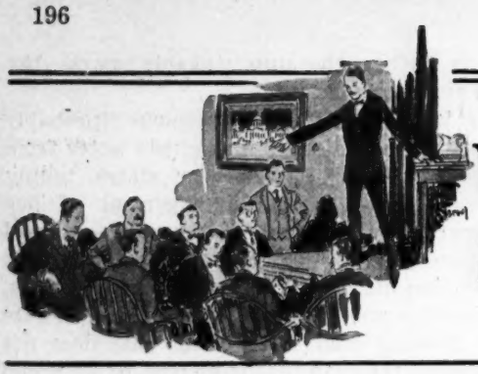
Coal Age is in receipt of an anonymous (probably it would be more correct to say an unsigned) letter from a mining town in one of the Southern states, telling of certain irregularities in the management of one particular operation. Of course, it is usually assumed that the communication to which the writer is afraid or unwilling to sign his name is unworthy of attention. On the other hand, a man may well heed the closed gate at a railroad crossing even though that gate does not display the name of the road that it guards, or he would do well to think at least twice before swallowing the contents of a vial bearing the red skull and crossbones, even though the label did not give the name or chemical symbol of the poison within the bottle. Similarly, may it not be wise to heed the warning of any man who gives notice of danger, even though for reasons all his own, which are possibly abundantly sufficient, he chooses to completely shroud his identity?

The letter in question tells of the resignation of a certified mine foreman and of the operation of the mine by an illiterate general foreman who, it says, was not a practical coal digger. It relates that this man and his brother, also a general foreman, attempted to take the examination but failed and came "back on duty, as usual, full of liquor." One of these men, a few days later, took a mule from the company stable and rode away to an illicit still in the mountains, returning with a supply of "moonshine," which he shared with the mine superintendent, who is a particular friend of his. While on this trip he left another uncertified man in charge to perform his duties, but this man passes at least as an up-to-date miner.

Now, 20 to 35 kegs of powder are daily handled in this mine by a motorman and triprider. This is thrown out of a car and piled up from 6 inches to 2 feet from the rail. Not infrequently the electric locomotive strikes and pushes aside or scatters one of these piles with possible spillage of the contents of some of the cans.

No comments on such management or methods of powder distribution are needed from *Coal Age* or any other source. We cannot vouch for the authenticity of the statements made but have no reason to doubt them. It matters little just what is the exact location of the mine in question. Drunken and incompetent officials and careless means and practices in handling explosives are not abnormal curiosities in the coal industry. Every practical mining man has seen both at some time or other. The fact remains that both should be eradicated, so far as possible. As our nameless friend puts it: "The miners here should thank their Almighty God that they still live. Every coal-mining man remembers the Wilkes-Barre explosion. He may soon hear of another at ———."

All evidence in the last four years has shown that Governmental control does not assure steady operation of industry. It has been seen that the public collectively is more spasmodic in buying than the public individually. The indecision of the herd may not extend to all individuals. Hence, with private ownership, some will always show a degree of activity in purchasing and building; but where, as in Government ownership, the judgment of the herd controls all action, no one can exercise his individuality.



WHAT THE ENGINEERING SOCIETIES ARE DOING

Rocky Mountain Institute Meets in Salt Lake City

By R. Dawson Hall

MOST vigorous among all the offshoots of the institute movement is one of the youngest of those institutions—that which has its home in the Rocky Mountains. Unlike the members in institutes held elsewhere, its constituents when they meet do not have anything to say about the difficulties of travel in the confines of the particular state in which they gather. As if it were the most natural thing to do, they assemble in numbers from many states. You meet them from Colorado, Wyoming, Utah and New Mexico. Perhaps some state has been overlooked, but if so the representation of that state was small or else it was not from the ranks of the mine executives.

The Utahans attended only the Salt Lake City session, but even most of these had a half day's ride to take, for there are no coal mines anywhere near the city. But distance does not deter a Westerner if he would foregather with his friends. However, as they come such distances, the gathering is naturally one of the leading men in the industry. All those present are the dominating factors in the fields from which they came; scattered fields they are, for the Rocky Mountain coal areas are not continuous like those of Pennsylvania, West Virginia, Illinois and Indiana. In the matter of magnificent distances between fields the Rocky Mountains resemble Kentucky more than any other institute area.

See Many Busy Mines in Rock Springs Basin

The members who left Denver for Salt Lake City on July 7 at 6 p.m. about filled a special car. They arrived in Cheynne, (pronounced Shi-Ann) Wyo., late in the evening and had some hours in which to explore the town. Late that night the train moved on over the Laramie range, arriving at Rock Springs, Wyo., about 8 a.m. There the members were met by a large deputation of mining men, for Rock Springs is one of the important mining centers of the West, the largest of the operating companies being the Union Pacific Coal Co., which has mines at Rock Springs, Reliance and Superior, not to mention many others in distant fields.

In the Rock Springs basin there are some 53 coal seams of which 12 or 13 run 5 ft. thick and over. The Cretaceous measures are remarkably productive, especially (at least at Rock Springs) the Mesa Verde formation. The party was loaded into automobiles, many of the members visiting the Rock Springs and Reliance plants of the Union Pacific, both producers of many years standing. The former, however, has recently had some important improvements which much interested the visitors. It was pleasing to note that at the Rock Springs plant the Union Pacific has two young women rewinding armatures. They are doing excellent work, which is really not remarkable, for is not the greater part of the winding of armatures at the electrical-machinery plants done by women?

Either directly, or by way of the plants mentioned, all the party finally arrived at the Winton colliery of the Megeath (pronounced Me-gahth) Coal Co., P. O. Megeath. It is a new plant opened under the direction of D. G. Thomas, long a general superintendent of the Union Pacific Coal Co. at Rock Springs, and a man well known and much liked in the Rocky Mountain district. There are at least four workable seams at this plant: No. 3 seam, which is 8 ft. thick; No. 1, which is also 8 ft.; a seam known as No. 7½, which is 6½ ft. thick; and No. 7, which is of the same thickness. This latter seam is unknown in Rock Springs and Superior.

Tunnel Driven in Rock by Coal Cutter

The coal dips from 12 to 16 per cent., and the main slope—the one opposite the tipple—is on the No. 7½ seam. A 500-hp. Ottumwa hoist operated by a General Electric motor-generator set pulls the cars up a 100 ft. slope. From an entry at that point a nearly level rock tunnel 400 ft. long has been driven back to cross the No. 7 seam. This tunnel, which is in sandy shale, was undercut by a Sullivan machine and drilled by a Spry electric drill. It is something new to undermine a rock heading with a coal cutter, and somewhat hard on the machine even though it be of a type rugged enough to make good headway through the resistant Utah coal, but the Sullivan machine showed itself equal to the work, and Mr. Thomas declares that the methods adopted explain why the excavation was done, in these days of high prices, for something under $27 per yard. A new electric 350-hp. hoist is to be installed to handle the tonnage from No. 7 seam, and one of 52-hp. is already being used to wind up the cars in the mine opened in seam No. 3.

An unusual feature, the outcome of circumstances beyond the control of the management, is the use of two gages for cars dumped at one and the same tipple. The cars going to the two upper beds, one only of which is now being worked, have a 30-in. gage, while those to the lower bed have a 42-in. gage. A Goodman 6-ton electric locomotive on a 3½ per cent. grade brings down the cars from No. 3 mine to the tipple. It will soon be replaced by a 10-ton cab locomotive of the same type.

An ingenious shoe engaging two wheels of one of the cars serves as a brake on the steep and crooked track leading to No. 3 mine. The road has curves as sharp as 25-ft. radius, and the shoe negotiates these curves without difficulty and keeps the trip under control at all

times, though the resistance has sometimes to be increased by putting sand on the rail. The shoe is laid on the track, and the car is drawn up onto it by the locomotive.

The tipple is of the Marcus type, supplied by the Roberts & Schaefer Co. Under the tipple are five tracks, a track for lump coal and one for egg. Both of these are equipped with box-car loaders. There are tracks also for loading nut, slack and run-of-mine. The box cars are loaded by Manierre equipment, which handles with care the most fragile of coal. The coal cars are unloaded on a one-car rotary dump, operated by compressed air for which a compressor is specially provided.

A No. 12 Sirocco double-compartment fan furnishes 125,000 cu.ft. of air per minute for the ventilation of the mine. So far no water has been taken from any of the openings. The mine has to be supplied with water, so as to keep it always safe for operation, the air of the surrounding country being so free from moisture that the ventilating current soaks up the water in the mine like a sponge, especially in cold weather.

The coal does not fire readily when exposed in piles. Piled 30 ft. high in the form of run-of-mine a pile was started in July and finished about Christmas of the same year. It had in all about 10,000 tons of coal. Yet it showed no sign of firing and was all shoveled out by steam shovel early in the present year. Some coal, put out in the spring, however, did take fire.

The company purchases power from the Union Pacific Coal Co., the current being generated at Rock Springs and transmitted, at 33,000 volts, a distance of about 14 miles. It is stepped down at the substation to 2200 volts and converted for use in the mine to 250 volts by a rotary converter. R. S. Robbins is the chief engineer.

Manufactures Ice for Use in Mine Village

The village is provided with an excellent store which has an up-to-date ice plant manufacturing 1000 lb. of ice per day, using for that purpose the refrigerating machinery and equipment of the Baker Ice Machine Co., of Omaha, Neb. The ice is sold at 2c. per lb. There are 100 well-built houses in the village of Winton, and 11 more are building. The company runs every morning a motor-truck service into Rock Springs, $14\frac{3}{10}$ miles each way. This truck makes the store in a degree independent of the railroad and provides the town with many luxuries, such as ice cream. Nowadays no mining town, however far from the city, can do without such delicacies.

The management of the Megeath mine furnished the visitors with a bountiful meal, after which several explored the underground workings. Returning to the automobiles the party was driven to town and beyond, to a point south of Rock Springs, where a recently reopened mine—the old Sweetwater colliery—is being operated by P. J. Quealy, the plans for the tipple being provided by Lindrooth & Shubart. The coal is dumped into a hopper and elevated on an apron conveyor from which it passes to the screens. The tipple is painted black with white outlines and looks quite attractive, though the effect is lost to the general public as the tipple lies far back from the main line of travel.

In the evening, entertainment was provided at the Elks club of Rock Springs and a dance at the Masonic temple. A few of the Denver party had their wives with them, but the assemblage would have been distinctly too masculine had it not been that the society of Rock Springs turned out in force to entertain the guests of the city. The welcome was patent enough, and the Rock Springs citizens reasonably judged so. They did not spoil it as some towns do, by a display of oratory.

At 2 a.m. most of the guests were snugly in the Pullmans when the train started for Salt Lake City, a number of Rock Springs citizens being of the party. Rock Springs is, by the way, the headquarters of the Union Pacific Coal Co., the offices at Cheyenne, Wyo., and Omaha, Neb., having been discontinued. This fact has enlarged in important measure the coal-mining circles of Rock Springs. Awakening in the morning the party found itself in the neighborhood of Evanston, still in Wyoming, but about to cross the Utah state line. From Curvo tunnel the line follows Echo Creek, and at Echo it enters the justly celebrated Weber Cañon, one of the show places of the West and in its low reaches the fair home of many early "Mormon" settlers. A short stop in Ogden and a change to the Oregon Short Line brought the visitors to the end of their journey.

Bathing Party Revels in Briny Salt Lake

After lunch a trip in automobiles introduced the visitors to a city young, but full of history and interest. Sight-seeing over, the institute again took to the railroad cars for a short trip along the shores of Salt Lake to Saltair, passing by the large evaporating beds where salt of great purity and some byproducts are produced. In the distance could be dimly seen the mills and smelters at which many of the great copper deposits of the State of Utah are concentrated and converted into metal.

Saltair is a bathing place on the shores of Salt Lake, a body of water that, having no outlet, has a salinity that puts the ocean to shame. A mouthful of it is almost suffocating, for every natural impulse resents the entrance of such a strong saline mixture. Consequently, though many bathe in it, none dive below the surface. After disporting themselves in the lake, the 150 persons of which the gathering now consisted had dinner at the Ship restaurant, many turning the occasion into a dinner dance. A few sets in the large public dance hall, and all were ready to return to the city.

The following day was given up to the technical sessions, several papers being read and an address being made by Governor Bamberger of Utah. The Governor is in the coal business, but that has not prevented him from advocating higher taxes for coal corporations, and he declared in his speech that in the past the impost had been too low. Into his remarks as to the excessive interest of the Government in the land and water rights of the Uintah Indians it is not necessary to enter, as they did not bear on the coal industry.

Good Papers and Interesting Discussion

Addresses were made by D. Harrington, for the Bureau of Mines, and by the genial president of the institute, John McNeil, one of Colorado's pioneers. P. F. Sharp, of Denver, in a short address then advocated raising the dues to $3 a year. Under the bylaws such a motion must go over to the next meeting, even though the sentiment seemed strongly favorable to the change. Many new members were received, R. Dawson Hall being made a life member. The name of A. D. Pierson was substituted for that of J. S. Thompson on the roster of the executive board, the latter member having died since the last meeting. Resolutions of sympathy with the president of the institute over the death of his

son, and with the family of Mr. Thompson, were then passed.

Joseph Appleton read a paper on "Storage-Battery Locomotives in Mine Work." In the discussion he said that the problem of using storage-battery locomotives in main-line haulage had so far hardly been tackled. He might say that over 90 per cent. of the storage-battery locomotives were being used for gathering and cross-entry work. Mr. Appleton said that locomotives of this type would haul one or two cars up a 17 per cent. grade. However, he would not recommend locomotives for such work, though heavy grades can be satisfactorily climbed if they are not too long. Grades of 17 per cent., 100 to 150 ft. in length, are being surmounted in regular operation with satisfaction, and there is no reason why single cars should not be hauled in rooms up a 17 per cent. grade even if the length of the haul is 300 feet.

A Few Battery Locomotives on Main-Line Runs

One of the members declared that, in some metal mines, storage-battery locomotives are being used in main-line haulage, hauling trips 4 miles on about a 0.4 per cent. grade. E. H. Weitzel, general manager of the Colorado Fuel and Iron Co., in his paper on "The Foreman in Industry," urged the importance of inducing the mine foreman to give up his arbitrary attitude in dealing with the men under him.

The superintendents and managers of modern companies have long felt that complaints should be carefully investigated and weighed by the management, and that the company should form its own judgments of the rights and wrongs of the day laborer and miner, but in many cases the foreman believes the discipline must rest with him and that his prerogatives must be respected. He is opposed to a change that will reduce his authority even though those above him have long ago consented readily to surrender some of theirs. Thomas Gibson, safety commissioner of the Union Pacific Coal Co., also made remarks commendatory of the paper.

The paper by J. B. Morrow on "Coal Washing on Concentrating Tables" was read by R. Dawson Hall in the absence of the author. Benedict Shubart, of Lindrooth & Shubart, read a paper on "Prevention of the Degradation of Coal on Screening and Loading," and C. M. Goddard one on "Modern Methods of Cutting, Drilling and Loading Coal." George B. Pryde, general superintendent of the Union Pacific Coal Co., said that by shearing the coal on one side the amount of powder used could be reduced 25 per cent. When both sides were sheared the powder bill could be cut in half, and 10 per cent. more large coal could be obtained.

Asked whether the Union Pacific was putting this experience into practice, he said that since the company had ceased to cater for commercial trade it was indifferent as to the size of the coal, but that if the company were again to enter the commercial field it would without question make use of the facts it has secured relative to the advantage obtained from careful shearing of the ribs.

President McNeil declared he would like to see an end of the use of powder, saying that it was observed in England that where large quantities of powder were used there was a great increase in the number of accidents. He would like to see an increase in the amount of shearing done and in the use of the hydraulic cartridge. It was stated in support of Mr. McNeil's expressed preference that the Germans, in the demolition of French villages and in the extraction of coal in the mines, used large quantities of liquid oxygen. This substance had practically driven out powder in German industrial service near the close of the war.

Shortly before 12 a.m. the meeting was temporarily adjourned to hear the organ recital at noon in the "Mormon" tabernacle, given on this occasion by the assistant organist, Edward P. Kimball. Exquisite music indeed was the sonata, the hymn of the nuns, a minuet, "Nearer My God to Thee" and Calkin's postlude. The wonderful vox humana stop produced most admirably, when used, the illusion of choirs singing in a distant cathedral.

In the evening a banquet was served in the Hotel Utah, reputed one of the four finest hostelries in America. P. F. Sharp was the witty toastmaster; John McNeil, the president, also made a short address, but the Rev. P. A. Simpkin (Parson Simpkin, he is affectionately termed) was the speaker of the evening. Many a tale is told of his sturdy patriotism in the stress of the struggle with Germany, his eloquence and devotion selling large quantities of Liberty Bonds. Unlike most of the clergy he had seen something of those pretty mining villages of happy homes which the West wrongfully denominates as "camps," causing us to look back to the times of the earlier settlers who lived in shacks of adobe and to think that the modern villages in which miners live are no better than those early abodes. He spoke on Bolshevism and the need that it be met, not by reaction but by real democracy, the same democracy for which we fought. We want democracy in peace as much as in war. He was followed briefly by R. M. Magraw and R. Dawson Hall.

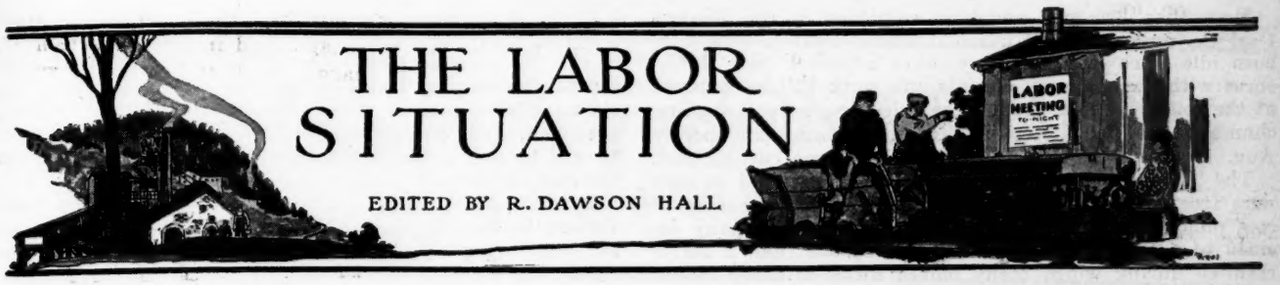
Takes Six Men, Foot to Shoulder, to Reach Roof

With the banquet the meeting practically came to an end. There were not a few who went by the Denver & Rio Grande R.R. to Castle Gate, but most of them were from Utah and some dropped off, on duty bent, by the way. Only two of the strangers were left when the time came to go into the Castle Gate mine of the Utah Fuel Co. Both had been more used to thin coal mines in which the seam was of almost pencil-mark thickness, and here was the Castle Gate seam 32 ft. thick—a symbol of the greatness and spaciousness of the West.

Some twenty odd miles away were Black Hawk, Hiawatha and Mohrland, with 26 ft. of coal. If the writer of this had space equal to his inclination he would write at length of the genial Western courtesy as he experienced it and of his trip to the model mines he has just mentioned and to the home-like villages of the Colorado Fuel and Iron Co. between Walsen and Primero, which he was privileged also to visit. But the journey to them was not a part of the institute, and he must refrain from introducing it, leaving any detailed description of the merits and equipment of these mines to those who know them better.

Coal Age Index

The indexes to *Coal Age* are furnished free to all who ask for them. The index for the first half of 1919 will shortly be ready for distribution, and a copy can be had by addressing a postcard to the Subscription Department of *Coal Age*.



THE LABOR SITUATION

EDITED BY R. DAWSON HALL

General Labor Review

So complicated with political aims were the demands of the British mine workers that it has been hard to understand their recent strike, which, by the way, was still continuing in the Yorshire district on July 28. Apparently every section of the country had a separate idea as to what were the aims of labor. The mine workers of Great Britain seek to assume with the marine transport workers and railroad men the governance of the empire. They would have the parliament, which represents the public as a whole, give place to soviets representing certain groups of working men. They argue that the mine workers can force their will and therefore should control national affairs.

Parliamentary life in the British dominions, no longer menaced by the king as in long past history, is threatened in these later days by the triple alliance of mine workers, sailors and railroad men. As the *New York Times* well says: "To Americans this (the program of the mine workers) will seem what the British press declared it to be, an attempt to put Parliament under the rule of the workingmen's council. The strikers sought to legislate under penalty of ruin to the nation if the Government resisted." But after all, the matter dear to the heart of the miner was not so much to save his fellow workers in other industries from an increased cost of coal, nor to protect the Bolsheviki of Russia in their campaign of murder and plunder as to take care of their own private interests.

Did They Barter Political Power for Larger Pay?

What they apparently really desired was that the shortening of the working hours should not reduce the earnings of the miners working in the same indifferent way in which they had always labored. When then Lloyd George, the premier, offered a rate of compensation per ton increased 10 per cent. to correspond to the decrease in the working hours, the miners, and therefore the mine workers, were appeased. For some reason the reduction of time from eight hours to seven was regarded as equivalent to a reduction in actual working time of 47 min., or roughly 10 per cent.

The increase in the wage of the miners added to the advance granted the day worker will cause the increase in the price of coal to be more than $233,000,000 per annum as formerly announced. If the first advance in cost was so great as to make it politic, if not advisable, to put the burden on the taxpayer, the second advance will increase the clamor for such a disposition of the increased cost.

Fewer Trains, Rationing and Closed Factories

The strike caused the closing of a number of factories, especially in the neighborhood of Sheffield. It compelled the Government to forbid the export of coal. It was announced the day before settlement that the train service would be sternly curtailed after July 26, perhaps as much as 40 per cent. The coal supply to private houses was limited to 200 lb. a week. With such a condition of affairs it was a great relief when on July 25 the country learned that the strike was at an end.

Unfortunately only Robert Smillie, the Scotchman, who is president of the Miners' Federation of Great Britain, consented to the new schedule. Herbert Smith, the president of the Yorkshire Miners' Union, still sulked and refused to induce his men to return to work. So that the ending of the strike, at first declared to be general, proved to have one vital exception—the Yorkshire coal industry.

The meeting of the delegates of District No. 1, in Scranton, Penn., on July 21, enables us to take stock as to the purposes of at least that section of the anthracite mine workers. The sessions started with all manner of declarations of fraud and deceit in the conduct of the elections, though the fault does not appear to rest with the tellers. The treasury contains $51,354.18 while the membership is 28,751, so the union has district funds of less than $2 per member. The district union is shown to have more members than it has enjoyed at any other time in its history. In November, 1918, the membership roll included only 10,785. The bank balance is the smallest in many years.

Hope Last War Will Afford the Last Scale

The insurgents on the floor threatened that if John T. Dempsey were elected to the presidency they would quit the organization and form a separate union. On July 24, the delegates registered their desire for a new wage scale as follows: An increase in wage of 60 per cent., a minimum wage of $6 per day, a 6-hour working day, a 5½-day week, closed shop, time and a half for Sunday work, and for that done on holidays and payment of consideration rates when mine workers are compelled to lose any time through delay in furnishing props or other materials.

The resolution committee presented this program and it looked good to the assembly, and as those present do not have to pay the bills, why it was the easiest thing to mark O.K. on them. Surely this is meant to be the "last scale."

On July 25, it was announced that Jack Dempsey, the former president who resigned last fall, was reëlected to that office. Thus the administration candidate wins. The vice-president is John Collins Kolodziejczak. He defeated George Isaacs, the insurgent candidate, and Joseph Yannis, who has been acting as head of the district since the resignation of Thomas Lowry of Scranton, several weeks ago.

Button Strike Causes Fear of Shut Out

At Pine Ridge Colliery, as was stated last week, 100 men refused to pay their union dues and the mine stopped work. Soon, Laurel Run and the Delaware colliery, two other mines of the Hudson Coal Co., joined in the strike so that by July 20 there were no less than 4000 men and boys idle.

All this was a violation of a well-established part of the agreement between the operators and the union. Some of the minor officials of the company declared, so it is said, that the mines would be shut down for six months rather than permit of these button strikes. As a result there is much talk of extending the strike. The men are fully wedded to the "double standard." They believe that they should be permitted to strike, in violation of the most sacred agreements in their contract, in order to establish that to which they have not the least fragment of a right. But if, having violated their agreement and having quit their work, the company locks them out, a terrible offence has been committed to adjust which other men in violation of their contract will also quit working.

At the Hazelton shaft colliery of the Lehigh Valley Coal Co., 800 mine workers who complained that they were only allowed to work 6 hours instead of 8 went on strike to compel the company to provide them with a full day's stint. The company says that the scarcity of coal in the slopes is a reason for the curtailment of hours. The breaker boys at the Evans colliery, it will be remembered made a similar complaint, which was granted on July 22, the boys resuming work.

More than 300 men and boys employed at the Traders Coal Co. operation in Hudson, Luzerne County, who have been idle since last February, have adjusted their differences with the company officials and work will be resumed at the colliery. Men are engaged cleaning up the working chambers that have been idle for five months, and before Aug. 1, it is believed the miners will resume cutting coal.

The Traders Coal Co. had, for a while, supplied its men with free powder, though this is not a usual proceeding at coal mines anywhere. On February last the company decided to conform with the universal custom, and a strike resulted during which many moved away to other towns.

Strike for Union Contract in Allegheny Field

The progress of unionization has been continuous in western Pennsylvania. One of the resistant areas has been along the Allegheny River and the mouth of the Kiskiminetas, north of Pittsburgh. Gradually this area is submitting to the union and in furtherance of the campaign to wipe out the nonunion spots in this area a strike was started on July 21 at the Allegheny Steel Co.'s mine in Brackenridge. For two years the union has been steadily trying to get this mine under union control, but the wages were higher than those provided by the union scale and the men did not favor a change. A further increase of 5 per cent. was being considered, according to Mine Superintendent J. N. Adams, when the men walked out. About 100 men are affected. The mines all around are unionized except the Penn Salt Manufacturing Co.'s mine at Natrona.

At one of the Pursglove-Maher mines in Ohio, the Willow Grove colliery, the men went on strike because they would not work with a colored man, all gentlemen of color having been excluded from Ohio mines for many years.

The mines of the George M. Jones Co., of Toledo and Columbus, located at Rendville and Modoc, have been closed down for about a week because of a strike. The men have two grievances relative to working conditions from which they asked relief. The Modoc mine, known as No. 255, employs 250 men and the Rendville mine, known as No. 268, employs 280 men. Efforts to settle the strike have not proved successful.

The operators and mine workers of the New River field held another conference in Charleston, beginning on Tuesday, July 22, with a view to reaching an agreement, if possible, as to a wage contract which is to replace the one which automatically expires with the ratification of the peace treaty. Almost a month has elapsed since the scale committees representing the operators and miners adjorned *sine die*. The manner in which the check-off should be made was the rock on which the conferees split. The committees were in session for two days at that time and while able to reach a common ground on most of the questions at issue were unable to agree on the check-off.

A strike had been scheduled for July at the Eccles plant of the New River Colliery Co., the men declaring that the coal must no longer be paid for by measure. The miners at Eccles and Sun being promised that scales would be put in by Aug. 5 professed themselves satisfied. The company indicated at the same time that before the expiration of the month it would pay the same rates as prevail elsewhere on Loup Creek, the new scale to be effective July 15.

Want Their Pay by Weight and Not by Measure

A strike order had been issued by the district board and would have taken place had not the concessions named been granted. The scale difficulty is of long standing. In July, 1918, there was a strike at Eccles to enforce a demand for scales and for payment by weight. The Fuel Administration straightened out the difficulty temporarily, but, the scales not being placed, a new strike was the almost inevitable result.

Disagreement between the company headed by S. D. Brady of Fairmont and the mine workers employed by that company in Mineral County gives early promise of being adjusted, a hearing having been held during the week ending July 19 before Special Umpire Barnett of Baltimore, who is of the faculty of Johns Hopkins University.

E. S. McCullough, commissioner of the Northern West Virginia Coal Operators' Association, and S. D. Brady, one of the prominent operators of the Fairmont field, presented the company's side of the case at the hearing. The claims of the miners were presented by Frank Drumm, president, and William J. Trickett, secretary, of District 16 and by Joe Loftus, an International Board member for the same district.

Before war-time prohibition went into effect there were threats in the mining field of Illinois that the men would not work without beer. Except for isolated instances, the threat has not been carried out. The men employed at the Midland Mines, No. 7 and No. 8, near Taylorville, stuck by their motto of "No beer, no work," but gradually drifted back to work. However, the "drought" is given as one of the reasons for an hegira of foreign miners from the Illinois fields, who are returning to their homes in Europe.

It is doubted whether a sufficient number of American miners can be found to man the mines, as they will need to be manned when the demand for coal increases in the fall. Many of the mines, it is declared, have less than half of their normal quota of available miners now. Most of the foreign miners are thrifty and when they were getting high wages during the war they saved their money and are now abundantly able to buy their passages back home.

Terre Haute Also Makes Big Wage Demands

When the fourth biennial convention of District No. 11, of the United Mine Workers of America, met in Terre Haute, Ind., which includes the "bituminous," or rather "non-block" coal field of Indiana, it was soon seen that the mine workers of that state were not going to be moderate in their program. The convention demanded, in the name of the mine workers, nationalization of the mines, a 5-day week, 40 per cent. advance in the wages of all classes of labor, a minimum scale of $7 per day, a working day of six hours, time and a half for overtime and double time for Sundays and legal holidays.

Twenty-five hundred miners at the mines of the Central Coal and Coke Co., in Missouri and Kansas, struck July 17 as a result of a conference between the presidents of the two districts. The reasons for the strike seem to be the failure of the arbitration board to reach an agreement on numerous grievances in the previous few weeks, grievances that had been pending for some time. The points of difference related to comparatively minor demands which, if granted, would have established precedents prejudicial to the best interests of the industry.

No formal explanation of the strike has been made, and the company has so far taken no steps to bring about a settlement. In view of the position of the company, that the subject of the grievances had already been provided for in the contract, and that the board's consideration of them under the contract presumably disposed of the matter finally, there seemed to be nothing that the company could do to straighten up the difficulty.

Want Another Powder Now It Is No Longer Free

Early in June the Central Coal and Coke Co. announced that a change would be made from a day-wage basis to a tonnage basis at a mine the company had just opened at Keota. The company has four mines at that place and one at Fleming. All these Missouri mines except the one mentioned, No. 68, were on a tonnage basis. The miners at No. 68 demanded that when the change to a tonnage basis was made, they be provided with DuPont powder, instead of the Excelsior powder which the company had been furnishing them.

The company offered to provide the desired powder, but was unable to set a date for such supply, having plenty of the Excelsior powder, but being short of DuPont in that field. The joint board met June 11, the men demanding a definite date for the supply of the desired powder. The 40 miners at No. 68 struck, because a date was not set. On July 15 the powder the men desired was provided at Mine No. 68. On July 17 a general strike began in all the mines of the company located in Missouri and Kansas. It involved 1000 mine workers in Missouri and 1500 in Kansas.

DISCUSSION *by* READERS

EDITED BY JAMES T. BEARD

Quality of Mine Timber

Letter No. 3—Few mine officials are as acquainted as they should be with the different qualities of the timber that they use in their mines, and I was glad to read the letter of one of my favorite correspondents, in *Coal Age*, Ostel Bullock, June 19, p. 1136.

An important point, which has already been mentioned by Mr. Bullock and is essential in securing good, sound timber for use in the mine, is the time of cutting the timber. As he has stated, the trees should be felled in the winter season when the sap has left the wood. As is well known, the sap starts to run up the tree in the early spring, producing an abundant foliage and adding a new growth to the tree. Late in the fall, most of the sap has returned to the ground. The outer wood of a large tree trunk is called the "sap wood" and is softer than the older wood at the heart of the tree, which is firm and hard and has a generally darker color than the sapwood.

In the cutting of timber, particularly white oak, experienced timbermen recognize a great difference between what is known as "second-growth" timber and the old original trees. Second-growth timber is soft and springy and does not possess the hardness or firmness of the old original timber. Again, there is a vast difference between live timber and deadwood. Only live timber should be cut for mining use, and this should be well seasoned before being taken into the mine.

Qualities of Different Woods

There are, in this locality, about forty different kinds of wood, which I will not attempt to name. Suffice it to say that the old white oak makes the best mine timber. White hemlock resists the changes from wet to dry and dry to wet quite well and, on this account, makes a good timber in the mine. Quaking ash, while hard, is so brittle that a good sized prop of this wood can be broken square off by striking it over some hard object, as a rock. Also, tracklayers say that ties made of this wood decay over night.

In working the low seams here, the props are seldom recovered and what is wanted is a strong, tough timber that will stand up under a good weight and give a cracking and snapping sound when the overburden is getting too great. This gives the miner warning and is particularly desirable in the robbing of pillars. Hard woods are always better than the softer woods, for mining use. Beech is only good for immediate use, as it will not resist change from wet to dry and dry to wet. White pine, poplar, cucumber, basswood or linn, and quaking ash are unfit to be taken into the mine.

However, when one observes good sound white-oak collars 12 x 14 in. and 16 ft. long, supported on three legs and spanning the double track at the bottom of a shaft, and finds them broken in a few years, he turns very willingly to steel timbers reinforced with concrete. Also, observing as I have at different times shafts and slopes lined with concrete, it is natural to conclude that timber for this purpose must eventually give place to concrete lining. Especially is the truth of this statement impressed on our minds by the growing scarcity of timber in central Pennsylvania and elsewhere.

Osceola Mills, Penn. S. D. HAINLEY.

A Modified Longwall System

Letter No. 4—Kindly permit me to add a word in answer to the letter of Andrew Orr Bain, *Coal Age*, June 19, p. 1133, in which he expresses a wish to know if I have "ever had any practical experience in working longwall under light cover."

My experience in longwall work has been in depths ranging from 80 to 270 fathoms, but I realize that a depth of even 80 ft. or less does not prevent the working of such seams by the longwall method, other conditions being favorable. It was my intention to say that a cover of less than 200 ft. did not make it necessary to consider adopting the longwall method to obtain the best results in working out the coal.

Let me explain, here, that there is nothing to be gained in the working of seams that lie at a great depth. Indeed, the greater the depth of the seam the more hazardous and expensive is the mining of the coal. But, the hazard and the expense does not increase as rapidly with the depth in longwall working as in any other system of mining, especially the room-and-pillar system.

Depth of Seam a Determining Factor

The impression I wanted to convey was that there was a greater advantage in working seams, lying at a depth of more than 200 ft., by the longwall method of mining than by other methods. In other words, when the depth of a seam exceeds 200 ft. it is expedient to consider whether that seam should not be worked by the longwall method, in preference to other methods.

In the majority of cases, the conclusion will be in favor of adopting the longwall method when the depth exceeds 200 ft., while a depth of 80 ft. does not present the same disadvantage in the use of the room-and-pillar system of mining, and the adoption of that method will often prove the most economical, unless it should chance that the price of land, per acre, makes it advisable to adopt the longwall method to prevent the damage to the surface that would result in the use of the room-and-pillar system.

I believe that Mr. Bain will agree with me that there is frequently a willful waste of coal, in the use of the room-and-pillar system, owing to the pillars that are left unworked, because they cannot be recovered with safety, or because they are needed to support the surface and prevent damage to buildings.

The experience of the past four or five years has certainly proven that coal is really the most important of our natural resources and the most available source of energy and emphasizes the need of eliminating wasteful methods of mining and burning coal. It was this fact that led me to state that the principles involved in Mr. Pocock's proposed method are those that must ultimately be applied to work seams lying at a greater depth than 200 ft.

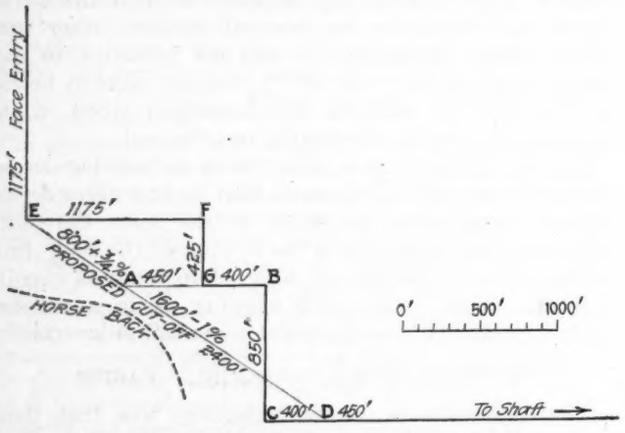
Again, where thicker seams of coal are worked by the room-and-pillar system, the amount of coal wasted in pillars that cannot be recovered or must be left in the mine is far greater than where the coal is thinner. I hope I have made my meaning clear in regard to the adaptability of the longwall method of mining.

Linton, Ind. W. H. LUXTON.

Mine-Haulage Proposition

Letter No. 4—Referring to the proposed change in the haulage road of a mine, as suggested in the letter of J. H. Dickerson, *Coal Age*, June 5, p. 1058, I feel as though the first portion of the new road from *E* to *A*, shown in his sketch, should at least be put to use, making the haulage, *EAG*, 1250 ft. and cutting out the old road, *EFG*, 1600 ft. thus saving 350 ft. of haul and eliminating two square turns in the road, at *F* and *G*.

The question of completing and equipping the remaining portion of the proposed road from *A* to *D* can only



SHOWING PROPOSED CHANGE OF ROAD

be decided by a better knowledge of the conditions and the amount of work that would be necessary, in order to open up and equip this portion of the road. The new road would obviously have many advantages over the old road. The length of haul from *A* to *D* would be shortened 500 ft.

The new road, being a single track, would not be as wide as the double-track portion of the old road and would require far less expense for upkeep. It would also cut out two more square turns, at *B* and *C*, in the old road. Curves on motor haulage roads always require much attention, and the cost for repairs is increased. The straight road would allow a greater speed of haulage and the chance of wrecks occurring would be far less than on the old road.

Estimating on 2,000,000 tons of coal in the property, as stated, and a daily output of 1200 tons, would make the life of this mine 2,000,000 ÷ 1200 = 1666 days or, say, 6 years, allowing 275 working days in a year. Considering the many advantages to be gained by opening up the new road, shortening the haul and allowing a greater speed, it would not be surprising if the daily output of the mine would be increased 20 per cent., which would mean a considerable lowering of the cost of production, per ton of coal mined.

Increasing the daily output 20 per cent., as suggested, would naturally result in shortening the life of the mine. One-fifth more coal would be put out in a day, and the time required to exhaust the coal in the mine would be five-sixths of the former estimate, making the life of the mine five years instead of six.

It is always the last few months or year of the mine that prove the most costly in operation. This fact should be taken into consideration, when judging of the advantages derived from opening up the new road.

The cost of maintaining the old road, during the final months or year of the mine, would be a large factor in the daily expense. There will, no doubt, be found many minor advantages derived from the new road that have not been mentioned and which add to the importance of carrying out the proposed change. SUPERINTENDENT.

Linton, Ind.

Letter No. 5—The inquiry of J. H. Dickerson, *Coal Age*, June 5, p. 1058, regarding a proposed change in the mine for the purpose of straightening and shortening the distance of haul, reminds me of a similar proposition in my own experience that I thought would be helpful in this connection.

About 25 years ago I had to put in a new double-track haulage road, for the purpose of cutting out an old road. The case was very similar to the one described in the inquiry to which I refer. The new road had to be opened up through a district where the settlement had taken place long since. The change, however, proved a great benefit and there was no further trouble experienced in keeping the new road in good condition, and the expense was greatly reduced.

ADVANTAGES OF SHORTENING HAUL IN A MINE

In the instance to which I refer, not only was the length of haul shortened, but the straight road decreased the wear and tear on the motor, cars and rails. The motormen were able to haul at a much greater speed on the straight road, since they did not have to slacken the speed to avoid the danger of derailment in rounding curves. There was less expense for keeping up the track and a less line drop or loss in voltage in the transmission of the current required to operate the motor. At that time, the cost of material and labor was high, and I found that the saving effected by the change, in these items alone, soon repaid the total cost of opening up the new road.

Aside from the advantage in hauling, the new road proved a great benefit to the men, by reducing the distance they must travel to reach their working places by 300 yd., or 600 yd. going and coming. This was a considerable reduction in their daily walk of five miles to and from their work and was much appreciated by every man employed in the mine, to say nothing of the time saved and the increase in the amount of coal loaded, per man per day.

As a result of the change, the motor was able to make two more trips a day, which meant an increase of 100 tons in the daily output of the mine and a saving of 7½ per cent. in the cost of production. Now, referring

to the case mentioned in this inquiry, and assuming that the output is increased to, say, 1300 tons per day, the extraction of 2,000,000 tons would require 2,000,000 ÷ 1300 = 1538 days, or a saving of, say 128 days when putting out 1200 tons a day.

Then, setting aside all other items and calculating the saving in wages paid the motorman, coupler and oiler alone, which we will estimate at $12 a day, the amount saved in the wages paid these men would be 12 × 128 = $1536. I realize, of course, that this amount would not be saved until the mine was exhausted, which would be five or six years.

However, the figures make clear the great advantage to be derived by the proposed change, and this is only one item in the saving that would result in the operation of the mine. It is my belief that when Mr. Dickerson has made the change he will only regret that he did not make it long ago. MOTORMAN.

McKeesport, Penn.

Certification and Safety

Letter No. 12—Referring to the question of certification of mine officials, I fail to see how there can be more than one side to this question. Certainly, mine officials in charge of work underground should prove by examination that they are worthy and fit to fill such positions as they desire.

Now, the fault is not with the certificate, but with the manner in which it is granted or the way in which it is obtained. The way some certified mine bosses perform their duties in the mine is quite different from what they expressed in their answers in examination. Had those answers compared with the daily practice of these men, they would not have been granted their certificates.

Personally, I feel much sympathy for the practical man who has held an official position in mining, but must step down because of his inability to answer some of the questions asked in the examination. Many a foreman of this type has had a practical experience that would carry him along all right in the mine, and has proven his value by the successful way in which he has conducted the work underground.

The miner should be given a fair opportunity to obtain a certificate, and the questions asked him in examination should be of a more practical nature so that he will be able to answer from his experience. To my mind, the examination is too often theoretical in its nature. While admitting that the theoretical and practical official will prove the most successful in the mine, I contend that every foreman must certainly have sufficient practical experience to enable him to succeed.

PRACTICE OF EXAMINING BOARDS IN INDIANA

In Indiana, only a candidate's number is known to the examiner when he marks the answers given to the questions asked. This shows a desire on the part of the examiners to be fair in the examination and not to allow personal friendship to influence the marking of the papers. Certificates are only given to those men whose answers prove them to be worthy and capable.

In order to expedite the work of examining papers, so that candidates will know their standing earlier, it seems to me that this work should be distributed among the examiners. My opinion is that each paper should be examined by the same person, which would seem to give a more uniform judgment than when the answers are marked by different members of the board.

Of course, it is natural for an unsuccessful candidate to think that some member of the board knew his number; or that those who were more successful had, in some way, obtained a knowledge of the questions. This, however, is an unfair judgment of examining boards, most of whom have a desire to be fair to all candidates.

Let me say, in closing, that the certification of mine officials is essential and even the practical miner loses nothing when he is required to spend some time in studying to obtain a certificate. OLD TIMER.

Linton, Ind.

Welding Split Gears to Axle

Letter No. 1—I was much interested in the inquiry of "Mine Mechanic," regarding the welding of a split-gear wheel to the axle, which he states was a trifle too small for the bore of the wheel. The inquiry states, *Coal Age*, July 10, p. 73, that the gear is to be mounted on the axle of an electric locomotive.

Having been up against just such a proposition myself, let me suggest and advise that the electric arc be used to build up the bore in each half of the wheel. When this has been done, and any projecting metal been removed, the two halves must be securely bolted together, as when in use. It is now possible to bore out the center of the wheel to the exact size required to fit the axle.

Let me add the suggestion that it would be bad practice to weld the gear to the axle. Not only would it be difficult to truly center the gear on the axle, which is most essential in the operation of the machine, but other difficulties would be encountered, and it would be impossible to again remove the gear should it require to be machined at any time. C. G.

Pittsburgh, Penn.

Letter No. 2—Referring to the inquiry that appeared in *Coal Age*, July 10, p. 73, allow me to say that the simplest way to make the bore fit the axle is to add a little metal to the gear by means of electric-arc welding, and then bore it out to the proper size. If it is a very small amount to add and the gear is high in carbon it may be advisable to enlarge the bore and then add the welded metal. In this way it will be easier to machine and true up the work.

Pure iron should be used for welding rods. Any kind of electric-arc welding equipment can be used. The one mentioned on pages 52 and 53, in the issue of *Coal Age* for July 10 is especially suitable for mine conditions.

JOHN G. KJELLGREN, Chief Engineer,
The Electric Railway Improvement Co.
Cleveland, Ohio.

Reducing Ventilation at Firing Time

Letter No. 9—Referring to the claims of Alexander McAllister presented in his letter, *Coal Age*, June 5, p. 1054, it is my belief that his statements should not be taken as the last word in respect to the matter of reducing ventilation at the time of firing shots in the mine. Notwithstanding the alleged success of his ex-

periments, I contend that he has not proved to the satisfaction of mining men, in general, that his theory is sound or his method a safe one to adopt as a means of lessening the chance of an explosion.

Laxity of Mining Laws Charged

Certain it is that the practice he has suggested does not agree with the generally understood principles of mining. The question resolves itself into a choice between creating an extinctive atmosphere in the mine, during firing time, or adopting the more reasonable course of removing all dangerous accumulations of gas and dust from the workings. While I am not acquainted with the requirements of the state mining laws in Kansas, it appears to me that they must be far below the standard if they permit such practice in the firing of shots. In British Columbia, such a method would be a violation of the mining law.

The instance mentioned, when the foreman ordered a shot to be fired and Mr. McAllister complied with the order and fired the shot, knowing it to be unsafe, is proof to me of the laxity of the state mining law in this respect. Other matters, regarded lightly by our friend but strictly prohibited in British Columbia, are the firing of shots in explosive mixtures of gas or dust, the use of blasting powder in place of a permitted explosive, shooting on the solid and the firing of more than one shot at a time in any one place. Our mining law further requires that every mine shall be thoroughly ventilated by an adequate supply of pure air and makes other stipulations designed to lessen the dangers of shotfiring.

In order to reduce the chance of an explosion occurring in a mine, it is necessary to remove the causes of such an occurrence: namely, the presence of a combustible mixture of gas and dust, existing in the mine atmosphere in such proportion as to be inflammable or explosive, and the danger of its ignition by open lights or by the flame of blasting. But it would appear that the theory of Mr. McAllister is opposed to taking such precautions. If I understand correctly he allows the gas and dust to remain in the mine, uses an open light and depends for safety on reducing the ventilation when firing shots.

Factors That Contribute to an Explosion

Now, there is no doubt but that a high velocity of the air current tends to extend an explosion in a mine and increase its violence, should an explosion occur. But, our efforts should be exerted to prevent the explosion from taking place; and it is certain that reducing the ventilation will not help to diffuse and render harmless explosive mixtures. There should be, therefore, greater safety in maintaining the ventilation at firing time, and thereby preventing explosive conditions.

While the explosive limits of methane and air are given as ranging from a ratio of gas to air of 1 : 5 to 1:13, these limits are not absolutely defined, but vary with the purity of the gas and other conditions. Then, in order to avoid ignition and explosion, it would seem that the oxygen content in the mine air should be reduced to the extinctive point; but that would support neither combustion nor life.

These conditions, however, are not to be realized by reducing the ventilation in the mine. If the mine is sealed off entirely when firing, there is still sufficient oxygen in the air to make possible the explosion of a dangerous mixture. It is quite evident that Mr. McAllister creates neither an extinctive nor a fatal atmosphere by his method, as the one would extinguish his light and the other would make it impossible for him to live in the mine.

It is stated that our friend fired 300 shots in 2½ hours, lighting as many as 40 shots at a time. This would require $300 \div 40 = 7.5$ visits to the working places, and each visit would consume $(2\frac{1}{2} \times 60) \div 7.5 = 20$ min. Conditions in the mine must be most favorable to permit such rapid work, and one must conclude there is an utter disregard for everything save the blasting of the coal in the shortest time possible.

It may also be observed that the chance of ignition is decreased, either by a decrease in temperature or an increase of pressure. But, the effect of reducing the ventilation in a mine is directly opposite to this, increasing the temperature and decreasing the pressure, which would tend to increase the chance of ignition of an explosive mixture. The use of black powder, moreover, increases the danger, by producing a larger volume when a blast is fired. This is all common knowledge and causes one to stand aghast and ask for what purpose is education in mining when men are permitted to ignore its first principles in practice.

Allow me to suggest, in closing, that this alleged practice can never become general in coal mining. I would recommend anyone who is favorably disposed to such a practice to study carefully the mining laws of British Columbia, which to my mind, are standards in respect to safety in mining.

Wm. Wesnedge.

Ladysmith, B. C., Canada.

Efficiency of Mine Workers

Letter No. 4—There are many phases of the miner's work that, if given the proper consideration, will be found to modify his efficiency by the effect they produce on his health and safety. We speak of miners having a knack for mining, loading or shooting, because of the skill displayed in their performing such work with ease. In reality, however, the fact is the miner has, through long experience and practice, so systematized his work as to produce results that mark him as efficient.

No set rules can be laid down that will enable a miner to become efficient. He must achieve skill in the performance of his work, through a close study of the conditions that surround him when at work in the mine. Many miners have no regular plan or system for conducting their work. Some will begin shooting almost the first thing after entering their place in the morning, and continue to shoot until the coal blasted has fairly blocked their place and made the work of loading their cars more difficult. It is not strange that such ones become exhausted long before they have done a day's work.

Again, it is not uncommon to find men mining coal in a manner that makes every ounce of the fallen coal represent a tremendous waste of energy. Some use poor tools both in mining the coal and in timbering their places, which makes the work doubly hard to perform. There are right methods and wrong methods of mining and loading coal. They represent the two extremes, in which the work is performed either with ease or with difficulty, and mark the man as efficient or inefficient, according to the results he achieves.

Reference has been made, in previous letters on this subject, to the alleged need of a six-hour day for coal miners. I fail to see in this suggestion a solution of the present depression that exists in the coal industry. Indeed, it is my belief that a six-hour day would complicate the present situation to an extent that the work of reconstruction would be fraught with perils equal to those of the war. The adoption of a six-hour day, at the present time, would be a grave mistake.

In my opinion, the present industrial depression is but temporary and the logical outcome of the adjustment of affairs to peace conditions throughout the country. Let us hope, then, that the signing of the peace treaty by all the powers concerned will be followed by a prompt readjustment of business conditions throughout the world.

A Glance into the Future

In looking forward to the much longed for normal conditions of peace, is it not clear that the industrial world will need the usual eight hours of labor to meet the extraordinary demand for the production of material products that will be required to replace the great waste and destruction of the war? There must be no backward step at this time when Bolshevism is terrorizing Russia and menacing other countries with its propaganda.

Let me ask, Can the farmer supply the world with foodstuffs in a six-hour day? Can the workers in our factories and mills supply the material demand of this and other countries by shortening the hours of labor at a time when the demand for products of every kind has increased a hundred-fold? Can the miners keep the fires of industry burning by working six hours of the twenty-four?

The Natural Division of a 24-Hr. Day

There is a natural division of time that nature ordained for the promotion of health, enjoyment, and the needs of mankind. The twenty-four hour day is divided into three equal periods, eight hours being given to rest of the body, another eight hours to recreation and enjoyment, and the remaining eight hours to labor. Too much sleep induces sloth and laziness; too much play gives rise to indolence, and too much labor overtaxes the body and breaks down the health. It is easy to imagine the results that would follow robbing the hours allotted to labor in order to increase the time devoted to recreation and enjoyment. Production of many necessities would fail and the price of living be increased.

While the present slack condition in the coal industry presents an argument in favor of the six-hour day, it must be remembered that we are passing through a crisis in the readjustment of the world's business. The future has a promise of untold prosperity. Let every worker, then, look forward with hope to the time when normal conditions will again prevail and American labor reap the reward for which so large a number of its fellow workers have fought and sacrificed on the battle fields of Europe.

W. H. Noone.

Thomas, W. Va.

Letter No. 5—Kindly permit me to refer to the statement of "Equality" made in his letter, *Coal Age*, June 19, p. 1136, regarding conditions in the mines of Great Britain. Having worked a considerable time in the mines of South Wales and England, besides visiting many mines in Scotland, England, South Wales and Belgium, under the guidance of the Educational Department and for the purpose of studying mining conditions, I am inclined to disagree with the suggestion that the coal mines in Great Britain are "poorly ventilated."

Owing to the generally gassy condition of many of those mines, the mine law is strictly adhered to in regard to ventilation. When a miner fires a shot he does not have to sit down on his box and wait a long time for the smoke and gases produced by the blast to clear away. There is sufficient air traveling in the working places to keep them clear of all accumulation of smoke and gas, so that the miner can return to the face a few minutes after firing a shot.

It is my opinion that the miners of Great Britain suffer less from that disease known as "miner's asthma" than the miners of this country. As is well known, that disease is contracted by continued work in places that are poorly ventilated and where the miner must either breathe the smoke and gases produced in blasting or lose much time waiting for the place to clear when a shot is fired.

Studying the Ventilation of English Mines

In our visits to the several mines for the purpose of studying conditions and work underground, it was the custom to divide the party into different groups. While one group would be investigating the haulage system employed in the mine, another group would be studying the mechanical equipment, and still another group the ventilation of the mine. It so happened that, on several different occasions, it was my fortune to be classed with the men studying the ventilation of the mine; and this fact has caused me to be well informed on that subject, in its relation to English mines.

Referring to the question of a six-hour day, let me say that naturally any man is willing to work shorter hours, provided the standard of wages is increased so that he will be able to earn the same amount as when working the full day, which is generally done, and the efficiency of the system so arranged as to enable the same quantity of work to be performed in the shorter time allotted for each shift.

It seldom happens that any change is made in the working hours when the operator does not get on the job and make arrangements to put out the same amount of coal and the miner, also, works to load the same number of cars as before.

I have worked as a miner on a ten-hour, nine-hour and eight-hour shift, and have found from experience that I could produce as much coal in eight hours as I formerly loaded in ten hours. The reason for this is that I knew my time was limited when working the shorter shift, and made every effort to perform the work in that time. Also, arrangements in the mine were expedited so that each miner was given his full turn of cars. All this required a little more energy on the part of each man employed in the mine.

In regard to the equalizing of the work in summer and winter, because of the varying demand for coal in those seasons, I know little, but think that some plan could be effected that would regulate the work in the mines according to the demand for coal in the market, and this would certainly prove a benefit.

Forty Fort, Penn. Robert Thomas.

INQUIRIES OF GENERAL INTEREST

ANSWERED BY JAMES T. BEARD

Storage-Battery Locomotive to Operate Pump

Recently, our mine which has been idle for several months received orders to start up again. During the period of idleness, much water had accumulated in the mine and considerable pumping was necessary to be done before work could be resumed. Ordinarily, on such an occasion, it would be necessary to run the power house continuously three 8-hour shifts, each day, which would mean expense for attendance and other incidentals during the entire 24 hours.

As a means of reducing this expense, however, it occurred to me that we could utilize the storage-battery locomotive in our equipment to operate the pump a portion of this time, which would allow of shutting down the power house during that time and still maintaining continuous pumping in the mine.

Following up this idea, we operated the pump from the power house during two 8-hour shifts and, at the same time, charged the batteries of the locomotive. Then, during the third shift the power house was shut down and the locomotive used to operate the pump. By this method, we get three shifts of pumping and are only at the expense of running the power house two of those shifts.

The batteries of the locomotive show that only about two-thirds of their power is exhausted at the end of its shift. There is no trouble, therefore, to run the locomotive out of the mine to the power plant where it is recharged during the next two shifts.

The question I would like to ask is whether this use of the locomotive is injurious to it; if not, it appears to me that we have hit upon a pretty good wrinkle for cutting down expense, at a time when every penny is needed. FOREMAN.

———, W. Va.

We quite agree with this correspondent that the method he has adopted is a good one. No possible injury can result from the use of the motor of a storage-battery locomotive for the purpose of operating a pump, any more than for the operation of the locomotive, itself, provided the operation of the pump does not overload the batteries, which is not the case apparently in this instance.

There is, of course, no saving of power by the adoption of this method, but there is a saving of expense in the production of that power. For example, assuming a 10-hp. pump, its operation during 24 hours will mean a power consumption of $10(24 \times 0.746) = 179$ kw.-hr., whether this power is developed in two shifts or three shifts. The only appreciable difference is the saving in attendance at the power plant during one 8-hour shift, when the fires are banked and the pumping is maintained by the storage batteries of the locomotive.

The saving effected is slightly diminished, however, by an amount determined by the efficiency of the motors operated by the batteries and the coal consumed by the banked fires at the power house. The fact that the batteries are only two-thirds exhausted at the end of their shift indicates that there is no overload and the operation of the pump probably imposes no greater duty on the motor than the running of the locomotive in the daily operation of the mine.

Position of Primer in Blasting

Kindly state, in the columns of *Coal Age*, what is the safest practice in the blasting of rock with dynamite. Where should the primer be placed, at the top, in the middle or at the bottom of the charge? We have had some argument on this point, and while the majority seem to prefer to place the primer at the top of the charge, there are those who claim it should be placed at the bottom, while others say that better results are accomplished when the primer is placed at the middle of the charge. STUDENT.

Delagua, Colo.

In blasting with dynamite, the explosion of the entire charge is practically instantaneous, which is not the case in blasting with black powder. In the former case, the explosive wave is transmitted by shock, the action being known as "detonation"; in the latter case, the explosion is transmitted throughout the mass of the powder by burning, each grain or particle of the powder igniting the one next to it, which action is known as "deflagration."

The detonation of dynamite being practically instantaneous, it would make no particular difference, as far as the explosion of the charge is concerned, whether the primer containing the cap was placed at the top, middle or bottom of the hole, just so it is in direct contact with the balance of the charge. The explosion of the primer cartridge is accompanied simultaneously with the explosion of the entire charge.

However, if the blast is to be fired by fuse, there are good reasons why the primer should not be placed at the bottom, or even the middle of the charge, but should be in the last cartridge inserted in the hole. The first and most important reason is that the burning of the fuse may ignite the dynamite before it reaches and explodes the cap in the primer. The dynamite ignited in this way may deflagrate or burn quietly without exploding, until the cap is detonated, in which case the force of the blast will be much decreased. Also, not only is a longer length of fuse required but there is greater danger of the fuse being injured when charging and tamping the hole.

The safest method, therefore, to pursue when blasting rock with dynamite is to place the primer cartridge at the top of the charge, which is common practice.

EXAMINATION QUESTIONS

ANSWERED BY
JAMES T. BEARD

Miscellaneous Questions

(Answered by Request)

[The following questions have been taken from those sent us by different candidates in examination, asking for their solution. All of them are difficult questions to be answered in the short time allotted to examination. Some of them can only be solved by trial, without resorting to higher mathematics with which few candidates in mining examinations are familiar, and some require data not commonly found in mining textbooks.—Editor.]

Ques.—Two airways, starting from the bottom of the shaft, are driven the full height of a 6-ft. seam of coal and 8 ft. in width; one of the airways is 900 ft. long and the other 3600 ft. long. How much should the longer airway be widened to cause it to pass the same quantity of air as the shorter airway under the same pressure?

Ans.—The solution of this question develops the formula

$$0.006863w^3 = 6 + w$$

in which w = the required width of the longer airway to cause it to pass the same quantity of air as the shorter airway under the same pressure.

Explanation—The first step in the solution of this question is to write the formula for unit pressure in terms of the quantity and cancel the constant factors p, k, q, leaving the expression lo/a^3, which has the same value for the short and the long airway, after the latter is widened to a width w.

For the first airway, $l = 900$, $o = 2(6 + 8) = 28$, $a = 6 \times 8 = 48$; and for the second airway, after widening, $l = 3600$, $o = 2(6 + w)$, $a = 6w$. Hence we write

$$\frac{900 \times 28}{48^3} = \frac{3600 \times 2(6 + w)}{(6w)^3}$$

Then, by cancelation and transposition, we obtain the formula shown above and which is most readily and quickly solved by trial, namely,

$$0.006863\ w^3 = 6 + w$$

By trial, we find the value, $w = 14.4$; and the longer airway must therefore be widened 14.4—8 = 6.4 ft., in order to pass the same quantity of air as the shorter airway, under the same pressure.

Proof—Assume a unit pressure of $p = 10$ lb. per sq. ft. and find the quantity of air this pressure will circulate in each of the two following airways:

Short airway,

$$6 \times 8 \text{ ft., } 900 \text{ ft. long;}$$

Long airway,

$$6 \times 14.4 \text{ ft., } 3600 \text{ ft. long.}$$

For the first or shorter airway, we have

$$Q_1 = 48\sqrt{\frac{10 \times 48}{0.00000002 \times 900 \times 28}} = 46{,}850\ cu.ft.\ per\ min.$$

For the second or longer airway we find

$$Q_2 = 86.4\sqrt{\frac{10 \times 86.4}{0.00000002 \times 3600 \times 40.8}} = 46{,}850\ cu.ft.\ per\ min.$$

Ques.—There are two airways in a mine, one 6 x 12 ft. and the other 4 x 9 ft., passing equal volumes of air under equal pressures. If the first airway is 1000 ft. long, what is the length of the other?

Ans.—The first step in this solution is to write the equation for unit pressure in terms of the quantity and dimensions of the mine thus;

$$p = \frac{klq^2}{a^3}$$

Then cancel all the constant factors p, k, q, leaving the expression lo/a^3, which shows that the length varies directly as the cube of the sectional area and inversely as the perimeter of the airway. In other words, the length ratio is equal to the product of the cube of the area ratio and the inverse perimeter ratio; thus,

$$\frac{l}{1000} = \left(\frac{36}{72}\right)^3 \times \frac{36}{26} = \frac{1}{8} \times \frac{18}{13} = 0.173$$

$$l = 1000 \times 0.173 = 173\ ft.$$

which is the length of the second airway that will pass the same quantity of air under the same pressure as the first airway.

Ques.—A mine having two shafts, one a downcast and the other an upcast, is passing 100,000 cu.ft. per min. Each shaft is 500 ft. deep and 15 ft. in diameter. The downcast shaft has an average temperature of 60 deg. F., and the circulation is produced by a furnace. Assuming an average barometric pressure in the downcast shaft of 30 in., find the average temperature of the upcast shaft, required to overcome a mine resistance of 8 lb. per sq.ft.

Ans.—The weight of 1 cu.ft. of air in the downcast shaft is

$$w = \frac{1.3273 \times B}{460 + t} = \frac{1.3273 \times 30}{460 + 60} = 0.0766\ lb.$$

The height of motive column of downcast air, corresponding to a unit pressure of 8 lb. per sq.ft., is, then,

$$M = \frac{p}{w} = \frac{8}{0.0766} = 104.4\ ft.$$

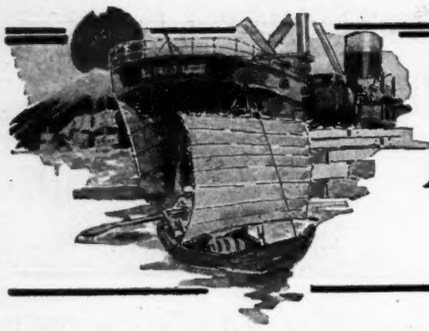
The next step is to write the formula for motive column, in terms of downcast air, which is as follows:

$$M = D\frac{T - t}{460 + T}$$

Finally, substituting the known values $M = 104.4$, $D = 500$, $t = 60$, the value of T is found by trial to be $T = 197.2$ deg. F.

Ques.—If a cubic foot of gas should explode, how many cubic feet of flame would it make?

Ans.—The theoretical flame temperature of methane or marsh gas, mixed with air and exploded in a free atmosphere offering no resistance to its expansion, is about 4173 deg. F., corresponding to an absolute temperature of 4173 + 460 = 4633 deg. F. The flame volume is, therefore, 4633 ÷ 460 = say 10 vol. That is to say the volume of flame produced by the explosion of a firedamp mixture, in free air, the firedamp being at its most explosive point, is practically ten times the volume of the firedamp.



FOREIGN MARKETS AND EXPORT NEWS

EDITED BY ALEX MOSS

Australia Commandeers Coal Supply

Prime Minister Is Authorized Not Only to Acquire and Dispose of All the Coal Mined in Australia, But to Fix Wages and Selling Prices

At a special session on May 1, reports Trade Commissioner A. W. Ferrin, of Melbourne, Australia, the Federal Council passed regulations under the War Precautions Act authorizing the Commonwealth Prime Minister to acquire and dispose of all the coal mined in Australia. The Prime Minister was also authorized to fix wages and conditions of employment in the coal-mining industry and to fix the prices at which coal shall be sold to the public and to abrogate existing contracts. The regulations as gazetted after the special session are as follows:

Whereas any serious interference with the supply of coal throughout the Commonwealth is likely to affect prejudicially the return, demobilization and repatriation of the military forces, to disorganize industry, and to interfere with the supply of goods and services needed in connection with the war:

Now, therefore, I, the Governor General in and over the Commonwealth of Australia, acting with the advice of the Federal Executive Council, hereby make the following regulation under the War Precautions Act, 1914-1915, to come into operation forthwith:

1. The Prime Minister may, if in his opinion the supply of coal is endangered or likely to be endangered, by order authorize the acquisition of coal on behalf of the Commonwealth.

2. Any such order may relate to any or all (a) coal stacked in any part of Australia, and (b) coal won from time to time or within any specified period or periods from any particular coal mine, or from some or all of the coal mines in any particular district or part of Australia, or from all the coal mines in Australia.

Giving of Notice—Compensation

3. Notice of the making of any order may be given to the owner of the stack or mine to which it relates, either (a) by the publication of a copy of the order in the Gazette or (b) by the service of a copy of the order upon the owner or person in charge of the stack or mine.

4. Upon notice of the making of the order being given, the owner of the stack or mine shall comply as soon as reasonably practicable, or from time to time, as the case may be, with all directions given by any person (in this regulation referred to as "an authorized person") thereto authorized in writing by the Prime Minister or by the Controller of Shipping appointed under the War Precautions (Shipping) Regulations 1918.

5. The method of acquisition shall be as specified in any directions given by an authorized person to the owner of the stack or mine.

6. The Prime Minister or the Controller of Shipping may appoint such agents as he thinks fit to sell or distribute coal acquired by the Commonwealth under this regulation.

7. Each agent so appointed shall keep such books of account as the Prime Minister or the Controller of Shipping directs.

8. The Prime Minister may, if he thinks fit, give directions as to the rate of wages and conditions of employment of persons employed in the production of coal acquired or to be acquired by the Commonwealth under this regulation.

9. The compensation payable to any person from whom coal has been acquired and the remuneration to any agent appointed for the purposes of this regulation shall be determined in such manner and upon such basis as the Prime Minister directs.

10. The selling price of coal acquired by the Commonwealth shall be such price as is fixed by the Prime Minister. The price may vary in different parts of the Commonwealth and as regards different qualities of coal.

11. Any person who fails to comply with any direction given under or for the purposes of this regulation, or who obstructs an agent, an authorized person, or any other person in the carrying out of this regulation or in the acquisition or sale of coal by the Commonwealth, shall be guilty of an offense.

12. The Prime Minister may, by order in writing, cancel or suspend any contract or agreement for the supply of coal.

13. Notice of the cancellation or suspension may be given (a) by the publication of a copy of the order in the Gazette or (b) by the service of a copy of the order upon each party to the contract or agreement.

Regulations Apply Only to New South Wales

In commenting on this action the local press said:

From today the Commonwealth Government takes, to all intents and purposes, control of the coal industry in New South Wales. Last week regulations were gazetted empowering the Commonwealth to exercise control over the sale and distribution of coal, as well as over its acquisition, and over the rates of wages to be paid in the mines. The object was to insure that the industry would be continuously carried on and a disastrous strike averted. The acting Prime Minister indicated that action under the regulations would apply only to the New South Wales mines at present; that from today it was intended to commandeer the New South Wales coal output and to put into agreement the terms of the Melbourne agreement, which provides, among other things, for increased wages for the miners and for improved machinery to deal with local stoppages. This agreement has been approved by the great majority of the miners.

On Saturday the first forward step under the regulations was taken by the Federal Government. In a special *Commonwealth Gazette* that was issued during the morning the Acting Prime Minister authorized the acquisition on behalf of the Commonwealth of "all coal won from time to time from all coal mines in the State of New South Wales." The Commonwealth Government, in other words, now controls all the coal output. The detailed administration of the scheme is in the hands of Rear Admiral Sir William Clarkson, who will carry out the acquisition of the coal for the Government and will appoint a committee in New South Wales to act under his instructions. From today the terms of the Melbourne agreement will be in force in the coal fields of New South Wales, and this will, of course, imply increases in the price of coal. It has already been stated that these increases at the pit mouth will work out at about 2s. 9d. (67 cents) per ton in the northern mines, 2s. 6d. (61 cents) in the southern mines, and 2s. 3d. (55 cents) in the western mines.

Order Empowers Prime Minister to Fix Prices

Further regulations relating to the price of coal acquired by the Federal Government under the recent war precautions order were issued on May 16. They empower the Prime Minister to fix the price at which a person may sell coal which he has purchased from the stocks acquired by the Commonwealth and make it an offense to sell at any higher price than that so fixed. Such fixed price may vary in different parts of the Commonwealth, and as to different qualities of coal, and shall have effect notwithstanding the terms of any contract relating to the sale of coal by a person who has purchased coal from the Commonwealth. Any such contract by force of this regulation shall be deemed to be varied in respect of all coal delivered under the contract on or after May 5 and during the continuance of the regulation. It is also provided that certain coal may be exempted from the application of the price-fixing order, in which case the regulation relating to the varying of contracts shall not apply.

Another important addition to the regulation related to the price of gas and coke. Where the price of coal fixed by the Prime Minister is in excess of the price hitherto prevailing the Prime Minister may, by order, declare (1) that any increase in the price of gas charged by a company producing gas from coal to which increased prices apply shall not be taken to be an increase in the price of gas within the meaning of any state act which provides for a sliding scale in the relation of the dividend payable by the company producing the gas to the price charged by it, and (2) that any company producing smelting coke or gas from coal for which increased prices are payable may in existing contracts for the sale of such coke or gas increase the contract price by an amount not exceeding that specified in the Prime Minister's order.

Ocean Freight Rates

W. W. Battie & Co. report that they have chartered a number of steamers for export coal, and that the situation on July 21 was as follows:

European Coal—Numerous orders in the market, on which shippers are offering the rates quoted below. Demand for tonnage exceeds the supply.

South American Coal—Rates have declined materially, as can be seen from the table below.

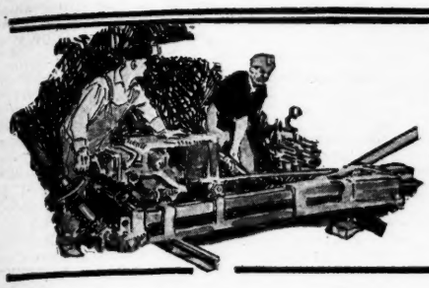
West Indian Coal—While tonnage can be secured at the rates quoted, only an occasional steamer can be obtained at lower figures.

Freight rates by steam on July 21 were as follows:

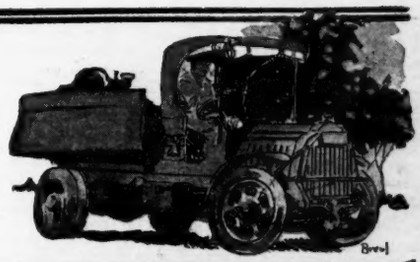
Genoa-Leghorn, $26.50, 1000 dis.; Spezia-Savena, $26.50, 1000 dis.; Piraeus, $28.50-$30.50, 1000 dis.; Trieste-Venice, $31, 800 dis.; Algiers, $26, 800 dis.; Cadiz, $23 50, 1000 dis.; Bilbao-Barcelona, $26, 1000 dis.; Antwerp-Rotterdam, $22.50, 1000 dis.; Lisbon, $22 50, 1000 dis.; Gothenburg, $26.50, 800 dis.

Pernambuco, $15 net, 500 dis.; Bahia, $15 net, 500 dis.; Rio, $16 net, 1000 dis.; Santos, $17.50 net, 600 dis.; Buenos Aires or La Plata, $14 net, 1000 dis.; Montevideo, $14 net, 750 dis.; Rosario, $16 net, 750 dis.; Bahia Blanca, $15.50 net, 1000 dis.; (charters for the foregoing business may be arranged on gross form of charter at $1 over the rates quoted.) To Nitrate Range, $14.50 gross prepaid.

Havana, $7.50, 600 dis.; Cardenas or Sagua, $9, 300 dis.; Cienfuegos, $9, 500 dis.; Caibarien, $9.50, 300 dis.; Guantanamo, $8.50, 500 dis; $9, 400 dis.; Manzanillo, $9.50, 300 dis.; Bermuda, $9 50, and Bermuda port charges and discharge free, 300 dis.; Kingston, $9 50, 400 dis; St. Thomas, $10, 500 dis.; St. Lucia, $11, 500 dis.; Barbados, $11, 500 dis.; Santiago, $8.50, 500 dis; $9, 400 dis.; Port of Spain, Trinidad, $11, 500 dis.; Curacao, $10 50, free port charges; Curacao, 600 dis.; Demerara, $13, 400 dis.



COAL AND COKE NEWS



Harrisburg, Penn.

Important "boundary pillar" decision is handed down. Attorney General of Pennsylvania states question should be settled by State Chief of the Department of Mines. Interesting case of M. N. Ayers and Lehigh & Wilkes-Barre Coal Co.

It is the duty of a mine inspector to hold hearings and decide in regard to the details of boundary pillars between anthracite mining properties, according to a decision handed down on July 22 by the Attorney General of Pennsylvania to Seward E. Button, State Chief of Department of Mines. The decision settles a question of jurisdiction which has arisen several times.

The question was whether a barrier pillar can be demanded between the property of Mary N. Ayers and a certain property of the Lehigh & Wilkes-Barre Coal Co., pursuant to the act of June 2, 1891, P. L. 176, providing for the safety of persons employed in anthracite mines. Mary N. Ayers is the owner of 4½ acres of coal located in the southern end of Wilkes-Barre, which is surrounded by the workings of the Lehigh & Wilkes-Barre Coal Co. (South Wikes-Barre No. 5 colliery). The Wilkes-Barre company advised Mine Inspector Thomas J. Williams, of the Eleventh (Wilkes-Barre) district, that it felt no obligation to act in the matter for the reason that the statute providing for barrier pillars was passed as a protection to men working in adjacent mines. There is no mine on Mrs. Ayers' property, nor is it possible to open a mine on a tract less than five acres in extent and on which the upper seam is 500 ft. or more below the surface.

In passing on the question of leaving barrier pillars, Deputy Attorney General Collins cites an opinion of the late Attorney General Elkin, dated April 15, 1897, and Atrorney General Collins states further:

"The language of this section is mandatory and requires the owners of adjoining coal properties to leave or cause to be left a pillar of coal in each seam of coal worked by them along the line of the adjoining property. This mandate of the law must be obeyed whether the coal in the adjoining property is worked at the same time or at a later date. As the inspector of the district you are required, under the provisions of the law, to aid in the determination of the width of the pillars left for the mutual protection of the adjoining property owners.

"The question as to who is charged with the duty to determine the necessity for a barrier pillar between adjoining coal properties has been the subject of judicial construction in many cases and may now be regarded as definitely settled.

"The attorney general is not vested with any authority to decide whether a barrier pillar in any given case is needed, the determination of that question resting with the tribunal created by law for that purpose. It was the evident intention that its members, composed of experts, after due consideration and with full knowledge of the physical situation of the property and all relevant facts in connection therewith, are best fitted to reach the right conclusion.

"In the case of Sterrick Creek Coal Co. vs. the Dolph Coal Co., Ltd., it was held that the duty of enforcing the provisions of the mine law relating to barrier pillars rests in the first instance upon the mine inspector of the proper district; but if the mine inspector fails, for one reason or another, to proceed in the premises as provided by the act of assembly, either adjacent mine owner may appeal to a court of equity for relief.

"Inasmuch as one of the above named owners of adjoining coal land has requested that steps be taken to establish a barrier pillar between her property and that of the adjoining owner, it will be proper for your department to institute the proceedings contemplated by the act to ascertain the necessity for such a pillar.

"You are, therefore, advised that the inspector of the district should give notice to the respective owners of the aforesaid properties of a meeting to be held, at some appointed time and place, by him with the engineers for the owners of the properties, to determine whether a barrier pillar is necessary and, if so, the proper width thereof."

Governor Sproul on July 24 approved the amendments to the workmen's compensation insurance acts passed in the closing days of the Legislature, and hereafter no system or schedule of merit rating can be applied to such insurance premiums except through a rating bureau approved by the Insurance Commissioner. The bill, which caused considerable discussion in the Legislature, also provides that copies of such insurance policies and endorsements thereon must be filed with the rating bureau.

Governor Sproul has vetoed the legislative resolution making an appropriation of $100,000 for the relief of sufferers by the disaster at the Baltimore Tunnel in Wilkes-Barre, in which 92 lives were lost. He states that the Department of Health has sufficient funds to take care of such emergencies.

Charleston, W. Va.

Increased production in central southern West Virginia. Causes preventing full production of high volatile coal. Smokeless mines unable to supply demand.

The strike of marine workers restricted the shipment of West Virginia coal, particularly gas coal, during the week ended July 19; the embargo which had been in effect against coal from the high volatile fields since July 7 not, however, retarding in the least the shipment of smokeless. During this period, however, there was unquestionably an increased production in most fields in central southern West Virginia, production being stimulated by the development of a further demand for steam mine-run, slack in turn benefitting by such a demand. The bulk of steam coal was sold in the open market rather than through contracts, but there is not the demand for such coal in the West that there is in the East. In the high-volatile fields there is not a full production, many concerns waiting for higher mine-run prices; a shortage of labor was another important factor preventing a full production, however, a large quantity of coal was mined in both high-volatile and smokeless fields during the third week of July. It has been found impossible to cover the shortage of smokeless fuel at tidewater existing since early in June and consequently smokeless was not embargoed. Even under favorable transportation and labor conditions the smokeless fields were unable to supply the demand during the week ended July 19. A heavy proportion of smokeless coal was being shipped to tidewater points for export and for bunkering.

The mines of the New River region were unable to supply the demand for the product of that field during the week ended July 19; though such mines were successful in materially increasing the tonnage of coal mined during this period largely because miners were applying themselves more assidously and also because of a continuance of an excellent car supply and the prompt movement of coal. The fact that there were not enough miners in the field was largely responsible for restricting production to about 80 per cent., although that represented fully a 15 per cent. increase in the space of a week. Strange as it may seem, the more smokeless coal there is produced, the more difficult it seems to be to obtain it, that condition being due, it is believed, to the fact that the navy is taking over quite a large tonnage.

Several factors combined to hold coal production down to about 65 or 70 per cent. in the Kanawha field during the week ended July 19, the principal factor being a growing shortage of labor in the district; though with more men at work than during the previous week there was an increase in production, facilitated by a continuance of an adequate car supply. It is probable that the embargo debarring the shipment of gas coal to tidewater held back production. Still another factor was the inclination of smaller producers to wait until mine-run reached such a price that they could afford to produce it at a fair profit, having no screening equipment. Of course with a steadier demand for mine-run, due to increased buying of steam coal in the East, slack is also reaping the benefit of such improvement.

Fairmont, W. Va.

Production in northern West Virginia crippled by car shortage, embargo on tidewater shipments and adverse freight rates as to Lake shipments.

After having enjoyed several weeks of excellent car service, production was crippled in northern West Virginia fields throughout almost the entire week ended July 19 because of a shortage of cars; causing the shipment of coal in the Fairmont region, for instance, to decline to the extent of about 300 cars a day as compared with earlier weeks of the month, as well as forcing, at odd times during the week, a suspension at several mines. It was found difficult to secure enough miners to man all the mines which were able to operate. A greater number of mines could have operated under more favorable conditions indicating a growing demand for the various coals produced in the northern part of the state. Shipments to tidewater, particularly to Curtis Bay (the principal tidewater point for northern West Virginia coal) were stopped during the week to a large extent by the embargo which was imposed on July 14; Curtis Bay shipments being only about a fourth as large as shipments during the earlier part of the month. There was also a decrease during the weekly period of shipments to Lake points as compared with previous weeks of the month. The decision of the Interstate Commerce Commission denying the application of West Virginia, Ohio and Pennsylvania mines for either a reduction in freight rates to northwestern points, or an increase in the rates from Illinois and Indiana, was received in northern West Virginia during the week and was rather discouraging; the small volume of Lake shipments so far this season having been attributed to adverse freight rates.

Birmingham, Ala.

Prominent operators protest against tonnage tax on Alabama coal. H. T. De Bardeleben makes complete statement as to cost of production. Market for Alabama coal discussed.

Coal operators of the Birmingham district have been waging an energetic fight recently against the proposed five-cent tonnage tax on coal and iron ore, which the state Budget Commission's general revenue bill would levy in Alabama. As the result of this battle, it was reported that the tax would be decreased to from one to two cents per ton.

In a discussion of the coal tonnage tax before the Ways, Means and Appropriation Committee of the Alabama House of Representatives, the coal operators' side of the controversy was presented (among others) by Henry T. De Bardeleben, one of the best informed and most successful coal operators of the state. Both Mr. Bush and Mr. De Bardeleben proved by their cost sheets, which were prepared under regulations of the United States Fuel Adminis-

tration, that the net profit per ton of coal is almost negligible.

Mr. De Bardeleben went into the details of production, showing the cost of labor, materials, supplies, transportation and every other item of expense. The conclusion drawn from his statements is that coal operators in Alabama will not be a large contributor to the income and excess profits tax fund. "Of all the coal mined in the United States," said Mr. De Bardeleben, "only 3 per cent. is washed, and one-half of that is mined in Alabama. The special tax applies to the rock, slate and dirt as well as the coal, and when that is taken out the tax will be six cents, instead of five. Sixty-five per cent. of Alabama coal is sold outside of the state, where competition is strong and the operators could not pass the tax on to the consumers; and for that reason the 35 per cent. sold in the state would have to bear the whole tax, or about 15c. a ton to Alabama consumers. It has been a struggle for markets with Alabama ever since the first mine opened. The market is confined to small territory, as the small increase in production shows, and our lines are being pushed in on all sides; Tennessee, Kentucky and Virginia coal on the north and east; Kentucky, Tennessee and Illinois coal on the north and west, and Mexican and Texas Oil on the south and west."

Mr. De Bardeleben said, "Alabama had lost tonnage in the last year amounting to 2,500,000 tons. With this tax bill put into effect, 3,000,000 tons will be lost. It would be the survival of the fittest, and with Alabama's narrow territory, not many operators could exist. There are few coal companies in Alabama of any great age that have not been in bankruptcy or verging on it during the last two or three years."

Dallas, Tex.

Coal men of Texas discuss coal shortage situation. President of National Coal Association addresses state meeting at Dallas. People urged to buy coal at once.

Texas bituminous and lignite dealers held a meeting in Dallas last week for the purpose of discussing plans for educating the people of the state as to methods for preventing serious coal shortage and famine this fall and winter. Harry N. Taylor, of Kansas City, president of the National Coal Association; J. D. A. Morrow, of Washington, and William Henderson, of Pittsburgh, Penn., also other officers of the national organization, were present.

"The production of coal in the first six months of this year," Mr. Taylor told the coal men present, "is 80,000,000 tons short of the production of the mines at the same time last year. This condition has been brought about by the cessation of the war and the lack of interest on the part of the buying public. While there is a good supply of coal on hand at the present time, and cars to move the coal can be had, yet if everybody continues to hold off to the last minute before buying their winter supply of coal, a shortage is inevitable. If the people attempt to make up the shortage in the six months of the cold weather, they will face an impossible situation and an inevitable shortage.

"The railroads will be called upon to move the biggest crop ever raised in the country. They will, consequently, be taxed by the lack of motive power and by the shortage of cars. The only possible outcome of the situation would be a shortage and a scramble for coal with high prices.

"The National Coal Association has assumed the responsibility of educating the public that the association may not be blamed for the shortage and the high price of coal which will result from the present policy. At this time there are plenty of cars and coal. If the public does not heed the warning and lay in the winter's coal supply, nobody can be blamed but themselves.

"In the East the coal shortage is already being felt, because of the large quantities used for industrial purposes. It is moving west and will be in full tilt by the first of September. We are trying to prevent a repetition of the situation of 1917."

Mr. Taylor told the Texas coal men that the National Coal Association represents an output of 600,000,000 tons of bituminous products and employs 750,000 men. All the bituminous and lignite interests in Texas were represented at the meeting, and promised to carry the problems to their people and conduct campaigns in an effort to induce the people to buy coal now for their winter's needs.

Ottawa, Ont.

Coal situation in Canada similar to that in United States. Necessity of placing orders for coal at once. Shortage of Pennsylvania anthracite noted.

Sir George E. Foster, Canadian Minister of Trade and Commerce, has issued a statement on the Canadian coal situation. He points out that with the signing of the Peace Treaty the United States Fuel Administration has automatically ceased to exist, and the production and distribution of coal is now governed solely by the law of supply and demand. All war-time regulations, restrictions and embargoes have been cancelled. The Canadian fuel control was disbanded on March 31. The coal supply, therefore, now depends on the individual efforts of the coal trade and the co-operation it receives from consumers in placing orders at once. The information at hand indicates that coal is not coming into the country in the same quantities as last year; this is especially true in the maritime provinces. For the first six months of the year, the Pennsylvania anthracite mines (on which central Canada depends for a large part of her domestic coal) had produced only 38,800,000 tons of coal, as compared with 49,100,000 tons during the same period last year, making a shortage to date of over 10,000,000 tons. Nor is there much hope that the shortage will be made up, owing to the scarcity of mine labor caused by the departure of many thousands of miners for Europe. With the strong demand for coal and the lessened production, there is little reason to hope that the price of anthracite at the mines will fall for many months, in fact the indications are that it will continue to advance as fall and winter approach. It is not possible to forecast what the labor situation at the mines will be, or what success the railroads will have contending against possible adverse climatic conditions this coming winter. The Government, therefore, urges all consumers to protect their fuel requirements by placing their orders at once. If it is impossible to secure full requirements of anthracite it is suggested that bituminous coal or other substitutes be acquired for use in the late fall and spring.

PENNSYLVANIA

Anthracite

Wilkes-Barre—A. F. Wolf, president of the Wolf Collieries Co., Inc., and the Central Coal Co. of this city, has acquired the J. B. McCreary coal lands in Fraley and Porter townships, in Schuykhill County, near Tremont, said to contain about 25,000,000 tons of coal. The new operation will be known as the Lykens Valley Coal Co.

Pittston—The No. 14 washery of the Pennsylvania Coal Co., at Port Griffith, which was destroyed by fire a number of weeks ago, is being reconstructed. This washery, which was one of the most modern in the anthracite field, was burned to the ground a few days before it was to begin operations, not a ton of coal having been sent through the new plant.

Kingston—In a decision handed down by Surrogate Cohalan in New York, on July 24, the entire income from coal lands in Kingston, Penn., was awarded to the Maltby heirs. These lands were leased to the Lehigh Valley Coal Co. for 99 years, dating from 1882. The lease in question calls for 154,000 tons of coal to be mined from the property as a yearly minimum, on a royalty of 25c. a ton.

Shamokin—The Susquehanna Collieries Co., operating the Richards, Pennsylvania, Scott, Hickory Ridge, Luke Fidler and Cameron collieries near here, has announced the adoption of improvements involving an expenditure of $4,000,000. A big steel and concrete breaker will be constructed at Green Ridge and a six-compartment shaft will be sunk to a depth of 900 ft. The coal from the Pennsylvania and Richards workings will be hoisted through the new shaft; several long tunnels will be driven to connect these workings with the shaft. Another feature of the proposed improvements will be a central electrical power plant to operate the mines in this section.

Bituminous

Springdale—A $6,000,000 power plant is under construction at this place by the West Penn Power Co. This company will mine its own coal for power purposes; the plant and hoisting shaft will be on one side of the Allegheny River, here, while the main body of its coal is on the other side. It is expected that the plant will be completed in about a year and will supply a large territory with power.

Waynesburg—A deed has been placed on record here for the interest of James R. Barnes, of Uniontown, on the coal underlying 127 tracts of land in Franklin, Center and Washington townships, Greene County. The transfer is to John W. Donnan of Washington for a consideration of $252,000. The coal is located in what is known as the Boileau block and consists of 1,500 acres.

Pittsburgh—Hillman officials confirm the report of a deal whereby the Hillman Coal and Coke Co. has acquired a controlling interest in the Diamond Coal and Coke Co. It is said that an expenditure of $1,500,000 is involved. Both concerns have large holdings in western Pennsylvania and operate fleets of towboats on the Allegheny, Monongahela and Ohio rivers. It was said that the Hillman company's desire to acquire holdings on the Allegheny River in addition to its mines on the Monongahela prompted the deal. A. R. Budd is general manager of the Diamond company.

Punxsutawney—The Penn Public Service Co. is constructing a transmission power line from Rossiter to the mines of the Juneau Coal Mining Company, at Juneau. This is the first step taken to connect the two trunk power lines of the company. A distance of about ten miles will be needed to connect at Marion Center where the other trunk lines serve coal operations. Several operations between Juneau and Marion Center are working to get the lines connected and thus give power to the operations along the Buffalo, Rochester & Pittsburgh R.R. in this valley.

WEST VIRGINIA

Kilsyth—The Big Creek Coal Co. has been incorporated with a capital of $30,000, to operate near Kilsyth. This concern, composed of local men entirely, consisting of G. W. Card, president; W. A. W. Carden, vice president; W. A. Higginbotham, secretary-treasurer. Another director of the company is Dr. U. S. Carden.

Locust—The Locust colliery is installing an electric haulage system in its mines here. For some time electric machines have been doing the undercutting but on account of difficulty in getting materials of all kinds the haulage project has been held up. It is expected that with the new transportation the tonnage will be greatly increased.

Charleston—As showing the extent to which government built steel hopper cars are not being used, and the side track space in West Virginia taken up by such cars, E. E. Winters, Chief Railway Inspector, has reported that there are 2068 of such Government cars on various railroads in West Virginia and adjacent states not being utilized. The Public Service Commission detailed Inspector Winters to make the investigation after protest had been made to the commission by the West Virginia Coal Association that not only were there a large number of idle government cars but that such cars were making operations difficult because of the side track space they occupied. In connection with the effort to induce the government to put the cars built under its orders in service, Assistant Director General of Railroads has given assurance that arrangements are being made to put such cars in service shortly and he has also promised a 100 per cent. car supply for West Virginia.

OHIO

Fredericksburg—The Mt. Cherry Coal Co., with headquarters in Columbus, has completed the erection of a fire clay grinding plant and a hollow building block manufacturing plant on its coal property near this place. The cost of the two plants was $200,000. Additional machinery is to be installed. The company of which Warren B. Ferris is president and general manager is operating two mines on its property.

Hamilton—The plant of the Hamilton Otto Coke Co., north of this place, is to be sold at public auction on September 17 at 2 p.m. The liabilities of the company are about $400,000, one half of which are unsecured. The assets are listed at over $700,000 (chief of which is the plant), including the real estate north of Hamilton. Personal property is listed at over $100,000. This plant is said to be one of the largest coke industries in Ohio. Higher production costs compared with coke plants more favorably situated, is stated to be the chief reason for its financial difficulties.

ILLINOIS

Valier—The Valier Coal Co. expects to get its main hoist in operation by the early part of ugust. The motor is 1350 hp. direct current, operated through a flywheel motor generator set. This is said to be the largest electric hoist in Illinois, and is of more than ordinary interest on account of the control being semi-automatic, having a push-button starter from the bottom of the shaft and an automatic stop.

Dowell—The Union Collieries Co. has recently put its main hoist in operation; it is driven by a 600-K.W. motor geared to the drum. The hoist is operated on purchased power through a flywheel motor generator set. The coal is hoisted in skips which have a capacity of ten tons. The time of hoisting, including loading, is about 30 sec. per trip. The entire plant is operated by electricity.

Herrin—Correction. The statement relative to the Big Muddy Coal and Iron Co. which appeared on page 126 of the July 17, 1919, issue of Coal Age was incorrect. The power plant referred to does not supply No. 7 mine and neither No. 7 nor No. 8 mine ever used Public Service power.

The Hofer Washed Coal Co. has decided to rebuild its plant recently burned and is now dismantling a steel tipple in Indiana, which will be erected at its Herrin mine.

West Frankfort—The West Frankfort Coal Co. is having a steel rescreening plant erected. This company has recently completed the installation of a 350-K.W., direct connected, direct current generator.

The Old Ben Coal Corporation is sinking a new air shaft at its No. 8 mine for the purpose of improving the ventilation. This concern will also install a large motor generator set at this point to give better power distribution. The company has a 33,000-volt power line running from its power plant at the No. 11 mine to all its plants except the recently acquired one at Lesser, Ill.

Sesser—At a luncheon given by Clarence Hutson, attended by Benton, Champaign and Chicago capitalists, plans were made for the organization of a big coal mining company to take over the operation of the Modern Oil Co. at Sesser, the West Frankfort Coal Co. at West Frankfort and the Crown Coal Mining Co., at Winkle. The new corporation, it is announced, will be capitalized at several million dollars, will have a large acreage of high-grade coal lands in Franklin and Perry counties and will be called the Little Gem Coal Co. Plans were recently perfected for the sinking of another new mine in Goode Township near Sesser, Franklin County; the company also expects to sink a shaft at Waltonville, in Jefferson County.

KENTUCKY

Stone—The Tierney Mining Co.'s plant, located here, has recently resumed operations after an idleness of almost six months. In 30 days' time the output has returned to normal and it is planned by the management to be producing 1200 to 1400 tons daily at this mine. G. C. Wood is general manager.

Lynch—The United States Steel Corporation is developing at this place what may be one of the largest coal operations in the state. The town adjacent to this plant now has a population of 6000 inhabitants, all houses being on company owend land. The company has about completed here, a hotel, moving picture theater, bank, department and other stores; furthermore, the town will have good fire protection and a fine water supply. This town is in Harlan County, near the Kentucky-Virginia-West Virginia line. A portion of the coal from this plant is made into coke in beehive ovens. A concrete road is being constructed from Lynch to Norton, Virginia.

ALABAMA

Birmingham—At a meeting of the Alabama Safety Association held here recently, James D. Hillhouse, former chief mine inspector, gave an address on "Reminiscences of a Chief Mine Inspector of 25 Years Ago." C. H. Nesbitt, Chief Mine Inspector, gave the association the benefit of considerable data which he obtained at the meetings of the Mine Inspectors' Institute, at Indianapolis, Ind. Hugh Lynch, a district mine inspector, read a paper on "Safety in Transporting and Handling Explosives in Coal Mines." At the meeting it was decided to hold a field meet in Birmingham this fall in first-aid and safety-first work.

TEXAS

Waco—Plans for a lignite carbonizing plant at Waco, Texas, were discussed at a meeting of the Lignite Operator's Association of Texas, at this place recently. J. C. McKay, of Dallas, secretary of the association, said the Government would spend $100,000 on such a plant, while the lignite operators of the state would spend $50,000 more, making $150,000 for the erection of the plant.

The plant will experiment extensively with Texas lignite. It is believed that the carbonized lignite can be used successfully for domestic use and in smelters. As the iron beds of east Texas are now being developed, a cheap local fuel will mean much for the future iron industry of the state. It is said that the carbonizing plant will be built by the Bureau of Mines and the Texas Lignite Operators' Association jointly. It is expected that the University of Texas will also put in a plant in connection with its school of engineering. Tar and gas are the chief byproducts; a market for the latter can be found in Waco which was one of the chief considerations in selecting that city for the plant. It is believed that similar plants will be established in Dallas, Fort Worth, San Antonio, Houston and other Texas cities of sufficient size to afford a market for the gas produced in such a plant. The plant to be erected at Waco will have a capacity of 300 tons of carbonized lignite daily. A recently developed use for Texas lignite is for burning gumbo ballast for the railroads; it has been found that lignite may be used more successfully than slack coal and is much cheaper. The Missouri, Kansas & Texas Lines has just let contract for 75,000 tons of lignite to be so used. When other railroads learn that lignite may be so employed, it is estimated that a demand for at least 400,000 tons of lignite annually will have been created.

IOWA

Knoxville—The Rex Fuel Co's. Mine No. 2, southeast of here, has stopped producing coal after operating for 15 years. one time it was one of the prominent plants of the state; the seam worked was 12 ft. thick in places with an average thickness of six feet. When the mine was working to full capacity, there were from 200 to 250 men employed; but of late years the company has opened up new mines and Mine No. 2 has gradually decreased shipments.

Des Moines—New coal mines are being developed in the vicinity of this place as follows: The Norwood White company is sinking a shaft to reach a 7-ft. seam at a depth of 300 ft.; this company is also developing a new mine near Norwoodville, to be known as Mine No. 6. Another new plant which has been in operation a short time is the "XL" mine southeast of the city. This operation will have an increased output the coming season. Other new mines just getting under way are operated by the Urbandale and Liberty companies northwest of the city, and the Interurban Coal Co., northeast of here.

Personals

Edward Law, son of the late Ernest Law, recently was admitted to the firm of Ernest Law & Co—coal and coke—as a partner.

Henry M. Payne has been spending July on professional business in Idaho and Washington and will return to New York early in August.

C. M. Weld, consulting mining engineer, has returned from war work in Washington and resumed practice with offices at 66 Broadway, New York City.

Edward M. Wagner, general superintendent of the Orinoco Mining Co. at Orinoco, Ky., married Miss Gladys Smith, of the same place, on July 23.

E. O. Floyd has been appointed general sales manager of the Rossendale-Reddaway Belting and Hose Co., Newark, N. J., the appointment to take effect Aug. 1.

G. W. L. Hall has resigned his position as cashier of the Merrimac Anthracite Coal Corporation, at Merrimac Mines, Va., to accept a position of auditor with the Austen Coal and Coke Co., of Austen, W. Va., to take effect August 1.

John A. Duglas, formerly general mine foreman at the Ida May mine of the Consolidation Coal Co., in northern West Virginia, has been appointed superintendent at the Page plant of the Loup Creek Colliery Co. on the Virginian Ry.

George C. Breckenridge recently tendered his resignation to the Bell & Zoller Mining Co., as superintendent of Zeigler, Ill. No. 2 mine. Mr. Breckenridge has been with the Bell & Zoller people about two years. At the present time his position has not been filled.

Ralph T. Fuller has recently become associated with the Producers Fuel Co., of Pittsburgh, Penn., as vice president of the company. For the past ten years Mr. Fuller has been affiliated with the sales department of M. A. Hanna & Co., in Cleveland, Ohio.

P. H. MacDonald has been reappointed superintendent at Mine No. 55 of the Consolidation Coal Co., at Madowbrook. Mr. MacDonald was superintendent at this place before going overseas and it is the policy of the Consolidation company to restore employees to their former positions as fast as they return from foreign service.

C. D. McClary has been made sales manager of the Pittsburgh office of the Western Electric Co., Inc. Mr. McClary was first connected with the Philadelphia office and was transferred to Pittsburgh in 1910. In 1916 he joined the sales force and two years later was promoted to be assistant sales manager which position he held until his present advancement.

Industrial News

Mayking, Ky.—Plans are being arranged by the Mayking Coal Co. for the construction of a new power plant at its operation here.

Welch, W. Va.—The Houston Collieries Co. has completed arrangements for the development of a coal property near here. Jacob Henry is construction engineer in charge of the proposed work.

Chicago, Ill.—The Export Coal Co., 112 West Adams Street, has been incorporated with a capital of $3,500,000 to engage in the export of coal. E. J. King, Fred E. Lang, and Albert G. Ziesk are the incorporators.

Uz, Ky.—H. G. Funk is understood to have completed arrangements for the leasing of local coal properties, and plans are now in process of formation for early development. Electrical equipment will be installed throughout the operation.

Pottsville, Penn.—It is interesting to note that the Philadelphia & Reading R.R. furnished a total of 1200 empty coal cars to bituminous coal districts on July 13, being the largest number of empties sent for some time past in a single day to such fields.

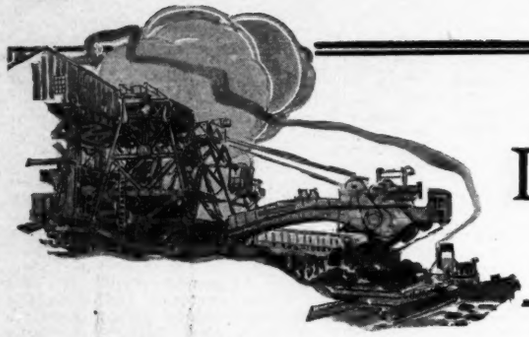
Lost Creek, W. Va.—The Eastern Utilities Coal Co. has recently completed the installation of new weighing scales at its local mine, for the purpose of paying the miners according to the amount of coal mined by tons instead of by cars, as heretofore.

St. Louis, Mo.—The Dozaw Valley Coal Co., with offices in the Wainwright Building, has been consolidated with the John T. Hesser Coal Co., Rialto Building. John Shaw head of the Dozaw Valley company, will be identified with the consolidated company.

Detroit, Mich. — The Cutler-Hammer Manufacturing Co., of Milwaukee, Wis., has recently opened an office at this place. The office here is, in reality, a branch of the Chicago office and bears the same relation to it as the Cincinnati office. H. S Kinsley, who is in charge at Detroit, has taken with him from the Chicago office, Messrs. C. W. Greenman and M. Dugliss.

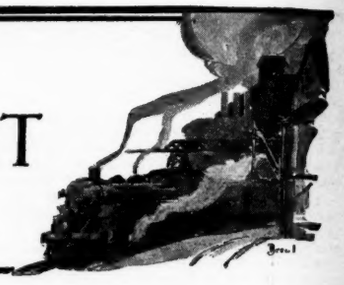
New York, N. Y.—Trade Commissioner Lundquist, at Johanneshurg, South Africa, has forwarded to the New York district office of the Bureau of Foreign and Domestic Commerce two samples of lamps in demand in South Africa for the use of miners. The lamps in demand must be strong. It is reported that one company will take 15,000 of these lamps per year. The samples can be examined at the New York district office.

Washington, D. C.—Coal cars piling up everywhere awaiting repairs while the country faces a fuel shortage and the Railroad Administration and the car owners argue over the damages were pictured to the House Rules Committee today by George H. Cushing, managing director of the American Wholesale Coal Association. The committee was considering congressional investigation of the possibility of a coal shortage this winter. Meanwhile in the Senate, Senator Frelinghuysen, of New Jersey, introduced a resolution for investigation.



MARKET DEPARTMENT

EDITED BY ALEX MOSS



Weekly Review

Publicity of Soft Coal Operators Causes Confusion in Minds of Readers—Analysis of the Bituminous and Anthracite Markets—Hard Coal Shipments Well Up to Those of Normal Years—Bituminous Will Be Short

TO the public in general, coal is coal. Therefore, the advertisements of the National Coal Association, warning of a coal shortage this winter unless consumers order their coal now, is confusing. The user of anthracite, particularly the domestic sizes of anthracite, wonders what all the ado is about. He has ordered his coal, put in his request weeks ago, in fact, and has not as yet received delivery. "Why," he questions, "all this insistence on buying coal now, when the dealer tells me he cannot deliver for a month to come?"

And his plaint is one worthy of notice. The National Coal Association numbers in its membership 90 per cent. of the bituminous operators of the country. Its interest lies solely with the producing and marketing of soft coal. All its advertisements and publicity work refer to this kind of coal. It has absolutely nothing whatever to do with anthracite, and it has failed to make this fact clear to the public. The result is that coal consumers are completely mystified and do not know what to believe.

Boiled down, the situation is this: In order to meet the estimated demand for bituminous coal, the mines must produce 537,500,000 net tons of soft coal during the present coal year, which began April 1, 1919, and runs to March 31, 1920. It is always assumed that all of the coal produced prior to April 1 of any year—except in case of stocking for emergency use—goes immediately into consumption. The actual production of soft coal during the first three months of the coal year—April, May, and June—totalled only 99,367,000 net tons. At this rate of production the indicated output for the next nine months of the coal year would total 298,101,000 net tons, or 397,468,000 net tons for the year. This means a shortage of 140,032,000 net tons by March 31, 1920.

If the soft coal mines of the country could be stimulated to produce to their full potential capacity, they could readily mine more than 600 million net tons of coal a year. The actual output in 1918 amounted to 585,833,000 net tons. Favorable mining and transportation conditions no longer exist, however, and the only way in which a radical shortage can be averted this fall and winter is for consumers of soft coal to put in their orders and keep the mines busy at work filling them.

Much of the shortage in soft coal will have to be met by the product of the Middle West mines, which at the present time are working at about 50 per cent. of capacity. The low volatile coals produced in the eastern section of the country are scarce already. Every ton of high-grade coal that will be mined during the coming year has been contracted for. It will be foolish for consumers who are not covered by contracts to persist in their attitude of discrimination. True, at this moment soft coal may be picked up at low prices, but this condition will not continue for long. The market is tightening from day to day.

It can readily be seen, therefore, that the warnings of a shortage in soft coal are well founded. Buyers would do well to heed them.

Let us now turn to the anthracite situation: Contrary to the general impression, the anthracite outlook is not so gloomy as it has been pictured. The estimated demands for the present coal year call for the production of 95,000 000 net tons of hard coal. Of this 57,500,000 net tons go for household use, the remainder for steam-making, or industrial purposes. During the first quarter of the present coal year the actual output of hard coal amounted to 21,261,000 net tons. Production has been stimulated about 10 per cent. since the early spring, and the estimated output of anthracite for the rest of the coal year can therefore conservatively be placed at 70,161,000 net tons, or a total production for the year of 91,422,000 net tons. Based on the present rate of output, there will therefore be a shortage of 3,578,000 net tons of anthracite by the end of the coal year. Whether this shortage will materialize depends much on labor and transportation conditions in the future, and the kind of weather we will experience this winter. The fact remains, however, that distribution of hard coal so far this season was never so great before, with the exception of 1917 and 1918.

WEEKLY COAL PRODUCTION

The new production level for bituminous coal, reached in the week of July 12, when production increased from an average in the preceding two months of around 8,500,000 tons to 10,220,000 tons, was sustained in the third week of July. Production in the week ended July 19 is estimated at 9,953,000 net tons, or but 3 per cent. below that of the week previous. It will be recalled that production in the week of July 13, 1918, was the highest recorded in a year of record-breaking production. An average of 10,000,000 tons a week will not be exceeded until buying increases in the Middle West.

The production of anthracite decreased slightly in the week of July 19. The market for domestic sizes is now generally good, and with no shortage of transportation it is evident that capacity to produce this summer is 10 per cent. lower than a year ago. Production in the week of July 19 is estimated at 1,823,000 tons, compared with 1,874,000 tons in the week of July 12 and 2,097,000 tons in the corresponding week of July, 1918.

As was indicated by the increase in production in the week of July 12, reported in last week's *Coal Age*, the demand for bituminous coal made a notable increase. Throughout the east the improvement in buying in the past several weeks has been marked, except in the Fairmont, Somerset and Cumberland-Piedmont fields. In Alabama and Virginia the market has not recovered to the extent that it has in the fields farther north. The Middle West, drawing coal from Illinois, Indiana and Western Kentucky, reports but slight improvement over previous weeks. Excepting Iowa, where half-time is being worked because of lack of market, the Missouri valley and far western fields record improved market conditions. The transportation situation appears to be well in hand, the losses of operating time because of car shortage having been small in all districts except Somerset, Pennsylvania and Hazard, Ky., the average for the country being less than 3 per cent.

The estimated production of beehive coke in the week of July 19 was 343,800 tons, compared with 325,000 tons the previous week and 631,700 tons in the corresponding week of 1918. The largest gains were in Pennsylvania and the far west. For the calendar year to date production is estimated at 10,541,000 tons, a decrease of nearly 6,500,000 tons compared with last year.

Shipments of coal to the lakes continue to decline, dumpings at lower lake ports for the week of July 12 being reported as 876,275 tons, compared with 923,939 tons the week of July 5. The decrease, however, is mainly attributed to the low production in the holiday week preceding. The total for the year is now about 1,400,000 tons ahead of last year.

BUSINESS OPINIONS

The Iron Age—The possibility of a strike at iron and steel works has loomed up in the past week, but it has not slowed down buying, and new business in a number of important products is still going on the books at a rate considerably exceeding current output of the mills. The present outlook is that if a strike is voted it will not be general or serious. At the same time some producers are recognizing a new hazard in planning for the last quarter of the year.

Dry Goods Economist—In the textile industries the demand for goods of all classes is insistent and is growing steadily. Stocks in the hands of wholesalers and producers are insufficient to meet current needs. Retailers are unusually busy for mid-July despite unfavorable weather, and are in great need of new goods for fall. The arrival of 526 buyers of dry goods and department stores in New York in one day this week and of upward of 500 on at least two other recent days testifies eloquently as to the need of stores for new fall stocks.

Marshall Field & Co.—Current wholesale distribution of dry goods was considerably in excess of the large figures of the same week last year. The total of orders from road salesmen for both immediate and future delivery was also larger than for the corresponding week of 1918. More merchants were in the market than during the same week a year ago. All report excellent business. Collections are satisfactory.

American Wool and Cotton Reporter.—In the Boston wool market the conditions are practically the same, with the price of wool strong and advancing. This is especially true of fleeces. Fine staple combing wools continue to be in demand, but the supply is becoming exhausted so rapidly that the trade is turning more and more to medium wools. The latter have gone up in price quite a little and it is expected that they will go still higher. The cotton market has again fluctuated rather widely, but such changes must be expected. As compared with the past the speculative buying of cotton is relatively small, and once any large speculation develops, prices may be very much higher.

Atlantic Seaboard

BOSTON

Market grows steadily firmer. Short car supply makes deliveries undependable. Higher grades hard to buy. Demand increases for coals of medium quality. Buying confined largely to spot coal. Hampton

Roads shippers decline further business in New England. Strike of marine workers apparently ended. Anthracite deliveries slow. Independent prices firm. Much criticism of statements that public is slow in buying.

Bituminous—There can be no doubt that the current market shows steady improvement from week to week. There is a better tone to prices, and the trade is obliged to be conservative in granting options. "Subject to prior sale," is again heard, for the first time practically in nearly two years, and a fairly active demand is counted on for September, if not for August. Where for several months steam coals have stood but one commission in the open market, it is now evident that two commissions are frequently being paid by purchasers in the effort to get coal forward promptly. There is still a good deal of discrimination as to quality, however, and in many instances the low-ash low volatiles are commanding up to 50c. more than medium grades.

Certainly the better grades are hard to secure for buyers in this territory. There is such demand now for low volatiles, for bunker and export use, that prices have been bid up at least 25c. on certain Cambria coals the past week. Shippers who have undertaken more contracts than they seem able to fill are buying these grades wherever possible, and even "D" vein coals are commanding higher prices today than the medium South Forks could realize a fortnight ago.

One result is the improving market for the medium grades from sections like Clearfield and Indiana Counties. Through middle houses there have already been sales of only fair grades from around Phillipsburg at $2.75 and $2.85, certain of the Moshannon coals having sold as high as $3.15. Attracted by better prices there is a good deal of this coal being offered, but so far only the more favorably known coals are being picked up in any quantity.

With an insistent export market and an interruption of nearly a fortnight in sailings for New England, the Hampton Roads agencies have all the business they can handle without looking to the trade here for further tonnage. During the past week some of the local factors have flatly declined spot orders for delivery at this end, and possible customers are being referred to the all-rail distributors. No change is reported in prices for export, $6.25 f.o.b. Hampton Roads being still the accepted figure.

Current quotations on bituminous at wholesale range about as follows:

	Clearfields	Cambrias and Somersets
F.o.b. mines, net tons	$2.35@2.80	$2.80@3.60
F.o.b. Philadelphia, gross tons	4.49@5.00	5.00@5.80
F.o.b. New York, gross tons	4.85@5.35	5.35@6.15
Alongside Boston (water coal), gross tons	6.35@7.05	6.85@7.65

Georges Creek is still quoted at $3.70 per net ton f.o.b. mines.

Pocahontas and New River are being quoted at $6.00@6.25 per gross ton f.o.b. Norfolk and Newport News, Va., in response to export demand. There are practically no spot sales for coastwise shipment.

Anthracite—While every effort is being made to secure better shipments for New England, receipts continue on a disappointing basis. Certain of the companies have been able to make deliveries slightly ahead of 1918, but the latter was not a normal year and there will be genuine cases of distress if coal does not come forward in better volume. The retail dealers are doing everything in their power to keep coal coming, both all-rail and by water, but there is just so much that can be spared from other markets.

We have yet to hear of a town or city in New England where the public has not put in its orders far in excess of the dealers' ability to make deliveries, and yet in spite of this there seems to be an organized propaganda to make the public feel that cars and men are idle in the anthracite regions because of the lack of orders! It has been said that certain independent operators, not satisfied with the spring price, determined not to mine coal until more remunerative figures should prevail, but these represent only a small proportion of the total tonnage.

The Boston retail dealers advanced prices 50c. on egg, stove and chestnut, effective July 22, the new figure being $12.50 for sidewalk delivery. Fifty cents is now charged for housing. Broken was advanced only 25c., and pea remains at the old figure, namely $10.50 per net ton.

NEW YORK

Domestic coals short of requirements, but dealers hope to obviate considerable trouble next winter if supply continues at present basis balance of the year. The marine strike interrupts coastwise shipments slightly. Bunkering demand picks up at ending of the strike. Bituminous in good demand, with prices steady.

Anthracite—Movement of anthracite shows some improvement and the situation looks a trifle brighter, with plenty of room for further betterment. There was an increase in shipments reported from the mines and dealers say they received a fair share of their requirement. Demand, however, continues active and dealers in most cases have plenty of orders on their books to keep them busy for the next two months.

Chestnut coal continues to be in larger supply than either egg or stove, while pea coal, which never did command a large local market, is more in evidence. Some shippers are sold far ahead for the two larger sizes and in some instances are said to have refused new orders.

Not so much was heard last week regarding premium coals, although it was rumored that many retail dealers were willing to pay increased prices if they could be assured of shipments. Local retail dealers, it was said, were not paying more than 75c. premiums for egg and stove, while line dealers and dealers in Canada were, it was said, willing to pay from $1 to $1.35 per ton.

The steam coal situation was kept in good check last week because there was comparatively little washery coal being produced, and producers are able to either sell or store those coals obtained by the ordinary production of coal.

Another increase of 10c. per ton for egg, stove, chestnut and pea coals goes into effect tomorrow (Aug. 1), and at the same time it is reported that the retail dealers of Manhattan and the Bronx will increase their delivery prices as much as 35c., in some instances, due to the paying of premiums for independent coals.

Quotations for company white ash coals, per gross ton at the mines and f.o.b. New York tidewater lower ports, during August, follow:

	Mine	Tidewater
Broken	$5.95	$7.80
Egg	6.25	8.10
Stove	6.50	8.35
Chestnut	6.60	8.45
Pea	5.20	6.95
Buckwheat	3.40	5.15
Rice	2.75	4.50
Barley	2.25	4.00

That there is a tendency on the part of bituminous coal shippers to seek line trade and get away from tidewater as much as possible, in order to avoid the present demurrage charges, was one of the statements made by Wilbur A. Marshall, president of W. A. Marshall & Co., 1 Broadway, New York, at the hearing conducted by the Interstate Commerce Commission into the charges of the Wholesale Coal Trade Association of New York, Inc., against the United States Railroad Administration. The hearing began on July 21 and continued all week at the Waldorf-Astoria, being conducted the first four days by Walter N. Brown, one of the commission's examiners, and then by Commissioner McChord. Many witnesses were examined during the week and all of them claimed the present demurrage charges of $2 per diem and five days' free time (averaged over one month) were unreasonable.

The demurrage rules at the Lakes, it was brought out, are five days' free time averaged over four months and $1 a day. Mr. Marshall was asked that, assuming the foregoing is a reasonable time at the Lakes, what would he say would be an equivalent liberal arrangement at tidewater. His reply was: "Well, I would say as a mere mathematical calculation that the equivalent of five days averaged over four months, if applied to a period of one month, would be four times as much, or twenty days."

Mr. Marshall said that all conditions being equal as between tidewater ports and the Lake ports as to demand, price, freight rate, etc., the shipper would send his coal to the Lakes because he would eliminate the risk of losses on account of the heavy demurrage charges at tidewater. He also stated that as a result of the existing demurrage charges on tidewater coal a large number of individual shippers of anthracite shipped only to the line points and eliminated shipments entirely to the New York tidewater ports until recently. They were brought back as shippers to tidewater by the offering of dealers of premiums of from 50 cents to as high as $1 per ton, which was due to the shortage of coal created by the failure of the operators to send coal to New York in fear of this same demurrage.

Mr. Marshall said that, comparing a four or six months' period for the Lakes and tidewater, tidewater should have at least seven days at tidewater, against the five on the Lakes, due to the irregularity of movement and the irregularity of character of the coal and the uncertainty of water movement. If we are to have a 30-day average at tidewater and the Lakes are to have a four or six months average, we should have, to be on an equal basis, at least ten days average, he said.

Mr. Marshall gave it as his opinion that there is approximately $1,000,000 involved in the present case. The defense began the presentation of its case late on Friday, July 25. The hearings are expected to continue three or four days this week.

Bituminous—While there is a firmness about the bituminous market here, there has not been so much urgency for deliveries as there was a week ago. Not that demand has not been continuous, because it has, but consumers have apparently felt they could get coal when they wanted it. Some of this attitude might have been the result of the marine strike, which ended on June 26.

All the urging to buy coal has failed to remove the discrimination of buyers against the poorer grades of coal. They insist upon receiving the best grades and are just as particular about the prices. There are many inquiries and spot orders running not more than three months are frequently booked. Some buyers are anxious even now to close contracts for the balance of the coal year, but they find few willing victims. Producers are careful about obligating themselves for any additional tonnages at this time.

The ending of the marine strike immediately revived the demand for bunker coals, and by the middle of the week these stocks were considerably smaller. Exporters report many new inquiries and a heavy demand from foreign countries for American coals. With freight rates reasonable they see a growing market for American coals.

Shippers do not expect any let-up in orders. Instead they look for an active market the balance of the year with good prices. Car supply does not improve and with the time for grain shipments close at hand operators look for much trouble from that source.

There has been an improvement in the average mine price of coal quoted for the various grades, but the range of prices shows little change from last week.

Producers of New River coals complain of the lack of labor, which they believe will increase during the month of August because of the return of many workers to their native country.

The railroad administration reports 5716 cars of bituminous dumped the week of July 25 as compared with 5127 cars the week previous.

Quotations for the various grades of coal, at the mines range about as follows:

	Spot
South Fork (Best)	$2.95@3.25
Cambria (Best)	2.95@3.10
Cambria (Ordinary)	2.45@2.60
Clearfield (Best)	2.95@3.10
Clearfield (Ordinary)	2.45@2.60
Reynoldsville	2.50@2.75
Quemahoning	2.85@3.00
Somerset (Best)	2.85@3.00
Somerset (Poor)	2.35@2.60
Western Maryland	2.35@2.60
Fairmont	1.90@2.25
Latrobe	2.20@2.35
Greensburg	2.35@2.50
Westmoreland ¾ in.	2.75@2.90
Westmoreland run-of-mine	2.50@2.60

PHILADELPHIA

Anthracite production cut by floods at mines. Dealers face August with light stocks. Outside market favored. Heavy shipments from Port Richmond. Retail ordering goes on. Consumers anxious. No greatly increased tonnage expected. Car supply normal. Dealers in strong financial position. Stove and egg much-wanted sizes. Chestnut moderate, and pea in excess. Buckwheat stronger; rice and barley very free. Bituminous in strong demand. Good coals hard to get. Prices firm. Tide trade good.

Anthracite—The retail trade is becoming sorely anxious as to its ability to give its trade the size of coal it has obligated itself

for. A survey of the yards throughout the city discloses that with the exception of pea most retail dealers are bare of the much-wanted sizes. Occasionally there are yards which seem to be well supplied with all sizes, but these are the yards of concerns who even through war times for some unexplained reason seemed to be able to command full stocks. Outside of this class the larger domestic sizes are scarce and the retailers are now beginning to display more concern as to when their shippers are going to take care of them.

At the shipping offices the statement is made to the dealers that they are doing the best they can, but for the time being they are unable to divert a larger tonnage to this market. It is known that the independent shippers are receiving good premiums in New England and Canada, and in some instances in the West, and for that reason their shipments to this market are very light. It is claimed that for stove coal the average premium is about $1, while for egg they are getting at times 75c. and for nut 50c. more than company circular, and at the same time insisting that their customers take a fair share of pea coal. That explains the fact that while the big producers have almost glutted their trade here with pea coal, the smaller concerns are having no trouble at all with this size.

The clearances from Port Richmond of the domestic sizes of anthracite for all New England points, from the sound ports to Eastport, continue very heavy. From reports here it would appear that the New England district is intent upon stocking up strongly on all sizes, as it is not to be supposed that the tonnage they are getting is going into consumers' cellars. An interesting feature of this situation is the willingness lately of some dealers there to take full consignments of pea coal. While this is only occasional, it discloses that the dealers there have confidence of their ability to induce consumers to use this size when the pinch comes.

The dealers at last seem converted to the fact that lack of orders from their customers is going to be the least of their troubles for the remainder of the summer. Some of them felt sure they would clean up before the middle of summer, but they have been receiving gradual but constant additions to their list, as the more wide-awake consumers have become aware of the fact that in addition to a possible shortage of fuel the coming winter they are also most certain to be confronted with a more than usual increase in price.

There can be no denying the fact that the heads of the operating companies here see little prospect of increasing the production much beyond what has been maintained all summer. Some of the best labor continues to leave the mines for overseas and the immigration figures are such as to lend little encouragement of an increase in the number of men for the rougher labor about the mines.

In the face of all of the foregoing conditions the local retail price situation, which has always been a source of much unrest at this time of year, is on an almost firm basis. The so-called price cutters are maintaining a schedule that closely approximates the average prices of the other dealers. The dealers also continue their endeavors to conduct their sales on as near a cash basis as they can, although this is not possible to the same extent that it was last summer. While the business is not as profitable as it was in the past, still the dealers are in good financial shape and it is believed that the shippers have less slow accounts now than at any time this summer.

So far there has been little or no difficulty with the car supply at the mines, the only criticism to make being on the part of dealers who are compelled to take equipment that is at times most inconvenient to unload, such as flat-bottom cars on trestles, which happens occasionally and is likely to be of greater frequency as the season advances. Small cars of 25 to 30 tons capacity are entirely out of the trade, due to the continued enforcement of the rules of the administration against the use of these cars in the coal trade. One road has upward of 3000 of this class of equipment stored along its lines. It can be said that their release will be acceptable to the shippers at least by fall, for in this way it will enable them to spread their production around a little better by splitting the tonnage of one big car into two small ones and thus occasionally gladden the hearts of two dealers instead of one.

Due to lessened production there was a noticeable trend of betterment in the buckwheat situation this week. Even the larger companies produced just about enough to meet current orders, and it seems also that the industrial plants are beginning to store this size in better volume. There was no noticeable change in rice and barley, and these sizes continue to in excess supply. Among small shippers sales have been made of rice around $2 and barley at $1.50, yet even at these figures none of the independents are willing to take on obligations for a definite period.

Bituminous—There is a good demand for bituminous coal and every evidence that this will increase. Reports from some of the outside markets are that the best coals are being more closely covered than they have been for some time. Certain it is that the high-grade coals are almost unobtainable for prompt delivery, and even the medium grade fuels are beginning to move more freely. As a consequence prices have been well maintained the past week, with an occasional shifting to a slightly higher level. The question of car supply continues to inject itself into the situation, and some shippers in southern fields report themselves considerably hampered on this account.

The heavy movement of high-grade coals all-rail continues into the New England territory and makes these coals scarce locally, even at good prices prevailing for spot coals. Manufacturers holding contracts are pressing shippers just a trifle harder lately for increased consignments, as the tendency of the really progressive concerns is to take in stock

Business at the piers continues good, both for bunkering and coastwise, although the overseas business is still handicapped by lack of bottoms. All export houses continue to receive numerous inquiries for quotations, much of which cannot be taken.

The price range during the week is well represented by the following table:

Georges Creek Big Vein	$3.05 @ $3.15
South Fork Miller Vein	3.05 @ 3.15
Clearfield (ordinary)	2.70 @ 2.80
Somerset (ordinary)	2.60 @ 2.70
Fairmont lump	2.50 @ 2.60
Fairmont mine-run	2.35 @ 2.50
Fairmont slack	1.90 @ 2.05
Fairmont lump (ordinary)	2.25 @ 2.35
Fairmont mine-run (ordinary)	2.00 @ 2.15
Fairmont slack (ordinary)	1.65 @ 1.75

BALTIMORE

Seamen's strike fails to halt movement of export coal. Car shortage beginning to be felt. Arranging new anthracite price schedule.

Bituminous—Another week has been recorded in which the American shipping strike has failed to halt the export movement from this port. Foreign ships took on a total of 38,890 tons of cargo and 2433 tons of bunker coal for export account for the week ended July 19, while the total foreign loading for the month of July to that date had run to 163,964 tons. The current week's figures will run to more than 40,000 tons, so that the final figures of the month are confidently expected to reach the high record of about 230,000 tons, despite the shipping strike, which undoubtedly held up an additional 150,000 tons or more. Because of a two weeks' embargo against the export pier here, some 210,000 tons of coal piled up, or was at line points routed here for foreign account. Some of this surplus has gone out this week, but there is still an oversupply at the two export piers.

From the mining sections of western Maryland and West Virginia, in particular come complaints of lack of empties for prompt loading. This is apparently due to the jam of freight of all kinds, including coal, at some eastern points resulting from the watermen's strike.

The local market continues brisk and prices are well sustained. An indication of the growing tightness of the soft-coal market is had in the complaints of some towns close to the mining regions that prices are being advanced for coal used there for domestic purposes.

Anthracite—The coming week the local retail hard-coal handlers will take up the matter of an increase in prices for the month of August. The Baltimore Coal Exchange will meet and discuss the general subject of possible freight-rate increases, premium paying, the proportion of company and independent coal coming through, etc., in its relation to fixing a new schedule for the month. That there will be some increase seems the general opinion, as quite a few dealers claim to be paying premiums on a good deal of the coal they are receiving. Not much coal is coming through, as there is a shortage even on premium coal. Stove and egg sizes remain particularly scarce.

Lake Markets

PITTSBURGH

Demand for steam coal slightly improved. Good byproduct coal brings premium.

While there has been a little improvement in the demand for steam coal, operators still insist that consumers are not stocking up to the extent that is necessary if a severe shortage next winter is to be avoided.

Demand for byproduct coal has increased and some difficulty is experienced in securing coal of suitable analysis, particularly with respect to sulphur. Purchases at $2.40 for mine-run are now quite common, lower priced coal proving unsatisfactory. Operators are selling only for early deliveries, as they regard contracting now as quite out of the question. For byproduct purposes both Pittsburgh district and Connellsville coal are moving freely. There has been a material increase in blast furnace operations, and the byproduct coking plants are operating full with scarcely an exception.

Lake shipments continue heavy, and the season total is such that operators expect the pace to decline within a few weeks. They insist that there will be no easier market at that time, however, and urge buyers not to defer laying in stocks.

Nothing definite seems to be known as to the attitude of miners or union officials as to whether any action should be taken when peace is declared, whereupon a move by either party for a modification of the present wage scale would be permissible. Emigration continues, involving chiefly the common labor at mines, but thus far working forces are maintained without a great deal of difficulty. There is no contract market and the market for prompt lots is quotable as follows: Steam slack, $1.50@1.70; gas slack, $1.80@2; steam mine-run, $2.25@2.50; gas mine-run, $2.35@2.50; 3 in. gas, $2.60@2.75; byproduct, mine-run, $2.40, per net ton at mine, Pittsburgh district.

BUFFALO

Steady but rather slow increase in bituminous demand. Firmer reports from Pittsburgh. Fair car supply. Jobbers active, but cautious. Anthracite in much demand. Lake shipments good.

Bituminous—The situation does not change much. Jobbers feel obliged to handle the trade carefully, for they realize that there are possibilities not favorable to strong prices as yet. They are doing much better than they were awhile ago, but are far from satisfied yet, for consumers do not come forward as they should. They are ready to make contracts at going prices, but that would not be satisfactory to either operators or jobbers

Locally the situation does not change much. The consumers want coal, but the supply has been fair right along and beyond the scarcity of certain medium sizes the trade flows pretty smoothly.

The conditions improve steadily, but not fast enough to satisfy the trade. Prices are about stationary at $4.55 for Allegheny Valley sizes, $4.80 for Pittsburgh and No. 8 lump, $4.65 for three-quarter, $4.20 for mine-run and $3.70 for all slack, with Pennsylvania smokeless $4.60 and smithing $5.70, all per net ton, f.o.b. Buffalo.

Anthracite—The market is in an uneasy state. There are many reports of a shortage that the consumer is asking for much more coal than can be supplied. Shipping agents are refusing orders right and left, and if it does not turn out that consumption has been very light all summer it is hard to see how consumers are going to get what they need. Canadian authorities are advising early buying and the addition of bituminous for mild weather.

Lake shipments of anthracite continue heavy, being for the week 149,200 net tons of which 63,100 tons were for Duluth and Superior, 50,800 tons for Chicago, 14,800 tons for Sheboygan, 14,000 tons for Milwaukee, 5300 tons for Fort William and 1200 tons for Sheboygan.

The prices of anthracite continue unchanged as follows:

	F.o.b. Cars, Gross Ton	At Curb, Net Ton
Grate	$8 55	$10 20
Egg	8 65	10 50
Stove	8 95	10 70
Chestnut	9 00	10 80
Pea	7 20	9 15
Buckwheat	5 70	7 75

Independent operators are asking from 75c. to $1.50 premium over these prices in some cases.

CLEVELAND

Labor in the Ohio coal fields appears restive and production has not shown the expected and needed pick-up following the July Fourth holidays. Demand for steam coal continues good. Lake shipments of bituminous coal continue to fall off.

Bituminous—Labor unrest appears to be the outstanding factor in the Ohio coal situation. Individual efficiency has suffered severely in the past week. One operator reports his labor not more than 60 per cent. efficient. All this, quite naturally, runs cost figures up and tends toward higher prices.

Northern Ohio steam-coal users are actively seeking supplies. One interest estimates it could dispose of 20 per cent. more fuel were it available for spot delivery. Consumers appear the least bit more willing to contract, while operators have receded in about like degree from wanting to do so. In general, operators are able to dispose of all their production for spot shipment. Demand for slack has increased somewhat more than that for mine-run and prepared sizes.

Consumption of coal in northern Ohio increases weekly, as industrial operations are growing. Every indication points to increased activity, and operators see the demand for fuel rising constantly.

Dealers have advanced their prices on No. 6 and No. 8 slack, No. 6 and No. 8 mine-run, and No. 8 ¾ in. 10c. a ton each. On Youghiogheny slack the advance is reported to be 5c. a ton. The price tendency in every grade is decidedly toward firmness.

Pocahontas and Anthracite—The situation remains much the same in both grades, demand from domestic consumers running far ahead of the supply. The outlook is that a large part of the winter's supply will have been put in by Oct. 1, thus to an extent duplicating the situation of last winter. Prices are unchanged but firm on all grades with the exception of lump Pocahontas, which some dealers have advanced to $8.75, while others are holding at $8.50.

Lake Trade—Lake shipments of bituminous coal are decreasing. Production at the mines has fallen off, being reflected in smaller shipments to Lake Erie ports. At the same time coal is moving rather slowly off the upper lake docks, while the unsettled prices of coal already forwarded contribute to the decrease. Final figures for the season to July 1 show shipments of bituminous coal, excluding vessel fuel, to have been 8,812,862 tons, a gain of 1,546,604 tons over 1918 shipments to July 1. July shipments will show a decrease of 500,000 tons over last year, it is feared. Last year at this time the lake trade was just beginning to show life. Including 391,640 tons of vessel fuel, Great Lakes freighters handled a grand total of 9,204,502 tons of bituminous coal to July 1.

DETROIT

Consumers of steam coal are not buying in the quantity necessary to make sure of adequate supply.

Bituminous—While Detroit wholesalers and jobbers maintain an optimistic attitude, the volume of business developing in the local market seems to show little increase. There is a feeling among the jobbers, however, that the improved demand which is reported from eastern markets will have a tendency to divert in that direction coal which otherwise might be pressing for sale in Detroit, with resultant weakening of the market.

Consumers of steam coal are evincing little indication of interest in stocking up. Some are buying, but in many instances the orders are apparently to cover only current needs and are for small tonnages and irregular in appearance. Despite frequent warnings of the probability of a deficient supply for those who delay, a considerable number of buyers are holding back. Their attitude indicates to the jobbers that they are expecting to benefit by purchasing coal at prices lower than those now quoted.

At present little bituminous is being sent into Detroit except on orders calling for direct delivery. There is not very much coal on tracks and prices are reported holding quite steady. Hocking lump is firm at the equivalent of $2.75 net ton f.o.b. mines. For Hocking mine-run, the quotation is $2, while slack is held at about $1.50.

Three-quarter lump from the Pittsburgh No. 8 district is offered at $1.75, with mine-run at $2 and slack about $1.75. Splint or gas lump from West Virginia is quoted at $3.25 to $3.50 for the four-inch and $3 for two-inch coal. Mine-run is about $2.20 to $2.50 and slack remains at about $1.85. For smokeless mine-run, which is scarce, the quotation is $2.75 to $3.

Anthracite—Dealers report the outlook in the anthracite trade is not reassuring. Buying is not particularly active. Considerable delay attends movement of shipments from the mines and dealers say there are indications of a shortage in supply when household consumers start stocking up generally.

Lake Trade—Coal is not moving freely to loading docks and the supply of cargoes falls far short of the tonnage offered for loading, with the result that a number of vessels are obliged to make the upbound trip without cargo. Shortage of cars and insufficient supply of labor at the mines are two of the principal reasons assigned for the light shipments.

COLUMBUS

More strength in domestic grades is apparent on all sides. Retailers are buying better, and the campaign to "Buy Now" is showing results. Steam sizes are still slow. Lake trade is moving along steadily.

The Ohio coal trade shows marked improvement, more especially in domestic sizes. Buying on the part of retailers is steadily increasing, as householders are placing orders both for immediate and deferred delivery. The feeling in domestic circles has improved during the past fortnight, and producers as well as shippers believe that the slump is now definitely over. Retail stocks are not large in any section, and considerable buying is expected in the near future. While consumers have been holding off on buying, the campaign fostered by the National Coal Association and carried along by local organizations is bearing fruit and buying has taken a spurt. The better grades, such as Pocahontas and West Virginia splints, are in the best demand. Some buying of Hocking and Pomeroy grades is reported. The outlook in the domestic trade is much better than formerly, and dealers are beginning to see an active trade. Retail prices have been advanced and are pretty well maintained at the new levels.

The steam trade is still rather slow, although some signs of activity have appeared. Railroads are now taking a larger tonnage on their contracts as freight movement has increased. Manufacturing plants are placing fuel contracts now and shipments have started on many of these agreements. Manufacturing appears to be expanding slowly under the influence of easier money conditions. The worst feature of the steam trade is the weakness of screenings. The prices on screenings show a wide range. Mine-run is fairly steady, and prices are not so low as formerly. Taking it all in all, the steam trade has shown some improvement recently.

Lake trade is steady although the tonnage moving to the Northwest does not show an increase. Comparatively few producers in Ohio fields are sharing in the lake trade. Vessel movement is steady and there are plenty of bottoms. The lake trade is expected to continue steady for the remainder of the season.

Production in Ohio fields is holding up pretty well between 65 and 75 per cent. of capacity. In the Hocking Valley the output is estimated at 65 per cent and possibly more. Eastern Ohio is credited with 70 to 75 per cent. Pomeroy Bend is showing an increase in output and the same is true of Cambridge and Massillon fields.

Prices at the mines for Ohio coal follows:

Hocking lump	$2.75
Hocking mine-run	2.50
Hocking three-quarter inch	2.60
Pomeroy lump	3.00
Pomeroy three-quarter inch	2.85
Pomeroy mine-run	2.75

CINCINNATI

Many orders, but stocks are inadequate to meet demand. Prices steady.

Orders for coal are multiplying with the local dealers, but the stocks are hard to get. The supply is growing scarce and indications are that many persons are going to be disappointed. Conditions at the mines, especially in the West Virginia fields, this week have been anything but good, the car supply being exceedingly bad.

Prices this week have remained steady, but the outlook is that there will be a general upward trend in the near future. Many large consumers who have been holding off against what they believed were too high prices are finding that dealers are slow to take contracts for their coming year's requirements, owing to the constantly growing scarcity. The best they can do is to secure week-to-week shipments.

LOUISVILLE

Steam movement somewhat better, with block coal demand strong. Byproduct and gas coal in light demand. Eastern Kentucky shipping considerable steam coal to southern markets.

There has been a considerable improvement in the demand for eastern Kentucky steam coal during the past few days with the result that operators are having far less trouble in disposing of their screenings. A good deal of steam coal is now moving into the southern markets, with cotton mills and textile plants buying a three to four months' supply. Some coal is still moving into the Northwest and Lake region, but southern prices are better than northern, and southern business is eagerly sought.

Due to a weak demand for gas and byproduct coal the northeastern section of Kentucky, from which Elkhorn coal is mined, is invading the Louisville and other domestic as well as steam markets, and has started screening coal in order to compete for business. Heretofore most of the Elkhorn coal was shipped on a mine-run basis, and was hardly known in this market, as it went principally north and east.

Retailers are not stocking much steam coal and are unable to secure enough block coal to stock, even if they cared to stock at high prices. Producers are still maintaining strong prices on eastern Kentucky block in spite of better demand and prices for steam, and are not anxious to sell, refusing additional business in many instances and holding such coal at $4 a ton, which represents a 25-cent advance.

River movements are equal to all demand of Falls City companies with facilities for handling river coal, there being a good boating stage. This has increased demand for river lump to some extent, as the river coal companies are managing to supply demand better than the rail companies.

Production in eastern Kentucky is about 70 to 80 per cent. of full-time operation, although short of normal due to the scarcity of labor. Production would be greater except for car shortage.

Western Kentucky is operating only about two days a week, with plenty of labor and only a fair car supply. Lack of demand for western Kentucky has been experienced all year due to competition from eastern Kentucky grades, which were zoned out last year, but which have recovered their popularity. There is a better demand for western Kentucky block coal.

Quotations are: Eastern Kentucky block, $3.75@4; mine-run, $2.50@2.75; nut and slack, $2@2.15; western Kentucky lump, $2.25@2.30; mine-run, $1.85@2; nut and slack, $1.50@1.75; fine screenings, $1.35@1.50.

BIRMINGHAM

Trade easy, with tendency toward increased strength in steam demand. Lump strong, no increase being noted in supply. Prices remain about stationary. Output up slightly over previous week. Car shortage reported on Southern and Louisville & Nashville.

While there has been nothing approaching a rush of orders for coal during the past week, an improvement in tone and inquiry is reported, and also a slight increase in both contract and spot business. With contracts closed by the principal rail lines for fuel for the next year, it is now expected that industrial demand will be better and an increased production will be warranted. The Louisville & Nashville closed contracts the past week for approximately 1,000,000 tons of Alabama coal, ranging in quality from unwashed Big Seam mine run at $2.45 to Cahaba washed at $3.86 per net ton mines, government prices being paid for the respective grades so far as can be learned. There is some inquiry now coming in from oil mills and other industrial sources, and it is expected that considerable tonnage will be booked by the commercial mines in the near future from consumers who have been holding off from the market. Inquiry is also being received from Georgia territory, which has recently been using considerable coal from Kentucky and Tennessee mines.

There are no new developments in the domestic situation, the market being featured by a continued strong demand for lump, with no relief noted in the way of increased production as yet.

Mines on the Southern and Louisville & Nashville railroads reported slight interruptions from car shortage, though little, if any tonnage was lost from this cause. Production for the week ending July 12, as reported to the Alabama Coal Operators' Association, was 265,838 tons, as compared with 187,173 for the previous week. Labor is short at some operations, and is causing a loss in output on the days operated.

Coke

CONNELLSVILLE

Flat price furnace coke contract. Free coke meets light demand. Foundry coke demand good. Production increasing.

Sharpsville furnace, in the Shenango Valley, will be blown in Aug. 10, a contract having just been made for furnace coke to the end of the year, at a flat price of about $4.25. Previous flat price contracts for the half year have been within the limits of $4.25 to $4.50, and from this it would appear that the market is not advancing; but, as a matter of fact, there are few operators willing to contract at flat prices, the majority feeling that they would do better to hold their coke, or to count upon high prices being obtainable for coal later in the year. Some sellers could probably still be found at less than $4.50, however.

The spot market shows no improvement. There is no demand to speak of, and there is considerable free coke, which producers are holding rather stiffly at $4.

Demand for foundry coke continues very good. There are limited supplies at $4.75, of indifferent brands, while best brands range up to $5.50, and there is moderately heavy call for even the highest priced coke. Car shortages are beginning to make an appearance, suggesting to some operators that shipping conditions are likely to be very unsatisfactory when bad weather sets in. Some bad order cars are also noticed, but the railroads are doing much more by way of car repair work than a couple of months ago. The market is quotable at $4 for spot and prompt furnace coke and at $4.75@5.50 for spot and prompt foundry coke, per net ton at ovens.

The Courier reports production in the Connellsville and Lower Connellsville region in the week ended July 19 at 164,220 tons, an increase of 6382 tons.

Buffalo—The market is pretty firm, as the furnaces are running more actively than they were, with prospect of continuing. Iron ore is moving more freely than it was, so that the lake fleet is getting about all the business needed. Jobbers quote 72-hour foundry at $7.60, 48-hour furnace at $7.25 and off grades at $7, with domestic sizes $6.75 and breeze $5.25, per net ton, f.o.b. Buffalo.

Middle West

GENERAL REVIEW

Improved production. Shortage of prepared coals. Car supply already inadequate. Labor scarcity.

There has been a decided improvement in coal production, this week, from mines in this territory. This improvement in tonnage is especially noticed in southern Illinois. That this extra tonnage was not warranted is shown by the fact that the market for steam coals is weaker than ever. In fact, several districts that have been maintaining their screening prices slumped badly during the last few days. The demand for prepared coals is such, on the other hand (and it may be said without fear of exaggeration), that today there is a coal shortage on lump, egg and nut sizes. This applies not only to the mines in Franklin County, but also to practically all of the mines in Indiana and Illinois producing a good grade of coal, with average preparation. Some operators have advanced prices on prepared sizes to around $3.05, as they wish to make up on their prepared coal what they lose on their screenings. There is no denying the fact that screenings have been selling at below cost prices for some time.

More mines have been reporting difficulty in obtaining enough cars. If under a very small demand there are not enough cars to accommodate the mines, it can be easily imagined what the situation will be later on when the buying public awakens to the peril of the situation and jumps into the coal market. Indiana suffered more from the car shortage than did Illinois. This is probably because Indiana mines are served by railroads having an outlet in the east. It is generally understood that the Railroad Administration, as well as the government, is doing everything it can to assist eastern operators to export their coal. Eastern mines are consequently being supplied with coal-carrying equipment at the expense of the less fortunate coal operators in the west.

Retailers throughout the northwest are having great difficulty in obtaining labor to unload their coal. This, coupled with the fact that the public are not buying very much, has kept down the demand for prepared sizes, although the present demand is already greater than the available supply. Retailers say that farmers are offering from $5 per day up to transient labor, and as farming appeals to this type of labor more than unloading coal, it is necessary for the retailers to do considerable of their own unloading. The writer came in contact with a retailer in Michigan who had spent the last four days in unloading coal from the cars into his bins.

CHICAGO

Domestic demand continues. Insufficient labor for unloading coal. Eastern coal hard to get.

The coal trade in Chicago is just about as demoralized as any spot in the Middle West. Of course, the demand for domestic coal continues, although this demand is less than in some districts because of the difficulty in obtaining labor to unload the coal. The situation on screenings and steam sizes is, if anything, worse than last week. Illinois and Indiana operators have been doing every thing possible to maintain prices on their screenings, and about $1.40 per ton has been the minimum price. A number of operators in the Hocking district of Ohio have taken advantage of this situation, and we understand that over 500 cars of Ohio slack coal have been shipped into Chicago at prices as low as 75c. per ton f.o.b. mines. Most of this coal has gone to the large public utility corporations or to the packers.

Eastern coal is becoming increasingly difficult to obtain. Pocahontas or New River prepared coals are being sold from $5 to $5.25, and strange to say, the demand for this kind of coal is strong. High-grade Kentucky coals are selling at from $3.50 to $4 f.o.b mines, for prepared sizes. As a matter of fact, but little eastern coal is coming into this territory, as a great many of the operators in West Virginia and other eastern coal-producing districts are sending their coal to the seaboard for export.

MILWAUKEE

Coal moving out slowly, while stocks on the docks pile up. Popular grades of anthracite continue scarce. Coke in poor demand.

The coal market continues dull, despite every effort to stimulate the outward movement and thus make room for continued supplies on the docks. Some of the yards are loaded to capacity at present. Stove and nut sizes of anthracite continue scarce, but dockmen promise relief from this situation in about two weeks. All other grades of hard coal are in good supply, as are also Pocahontas and steam coal. The coke market is stagnant and stock piles are looming higher every day. Prices of coke and coal continue unchanged. Receipts by lake are still ahead of last year. Thus far 297,574 tons of anthracite and 1,487,997 tons of soft coal have been received, the gain over last year being 66,320 tons of the former and 250,262 tons of the latter.

ST. LOUIS

Unusual demand for high-grade domestic coal that cannot be met. Future dubious on this coal, causing considerable worry. Domestic demand on lower grades easy. Steam condition extremely bad and promises no immediate betterment. Car shortage prevailing; much unrest among miners.

The local situation is extremely bad at present, occasioned by the unusual demand that came about suddenly for Carterville coal for domestic purposes. Both city and country are clamoring for this grade of coal. The efforts of the dealer to divert business to inferior grades has not been successful. There is a decreasing call for the steam sizes, with the result that nearly all mines are loaded down with steam coal, and are unable to work. When they do work in the Williamson and Franklin County field, it is usually with a shortage of equipment. Some mines have been idle two days a week because they could not get equipment. In this field the miners continue to leave, especially the foreigners.

Mines that started up recently, after being idle for some time, have been unable to get men except by taking them away from other operations. The field will not show a large increase in tonnage on this account.

Mines that formerly produced 3000 tons a day are finding it hard to get out 1500 tons a day now. There is much unrest among the miners in this field as well as in the other fields. They do not understand why peace has not been officially declared, and they insist that some immediate action be taken to enable them to realize their demands on the operators.

The railroad tonnage is good out of this district at the present time. Stoker coal for railroads is relieving the screenings situation to some extent. Conditions in the Du Quoin field are somewhat similar to those in the Carterville district. In the Mt. Olive district conditions are more normal than in the other fields. The mines are getting better working time generally, and the movement of coal is good.

In the Standard field there is all kinds of trouble, shortage of equipment and shortage of labor. Failure to move screenings keeps the mines idle for several days, and other mines in the same district may be idle because they cannot sell their lump coal.

Coal is selling far below cost at many mines. This is an effort of the operators to keep their organizations together, anticipating better selling conditions shortly. There is, however, much dissatisfaction among the men in this district. This coal is hardest to move in all sizes, but especially in the steam. Railroad coal from this district showed up somewhat better the past week. In St. Louis proper screenings from this district went down to $1.10, and there has been a general decline off and on for this coal. The country call for it is very light. The demand for anthracite is fairly good in St. Louis, with practically nothing coming in. No smokeless coal is booked for the St. Louis market at this time, and nothing from Arkansas. There is a plentiful supply of gashouse and byproduct coke that is not moving so fast as it should.

Coal and Coke Securities

New York Stock Exchange Closing Quotations July 28, 1919

STOCKS	Ticker Abvn.	Bid	Asked
American Coal Co. of Allegheny	(ACL)	45	....
Burns Brothers, Com	(BB)	155	157
Burns Brothers, Pfd	(BB)	110	115
Central Coak & Coke, Com	(CK)	55	....
Central Coal & Coke, Pfd	(CK)	63	....
Colorado Fuel & Iron, Com	(CF)	51¼	52
Colorado Fuel & Iron, Pfd	(CF)	....	125
Consolidation Coal of Maryland	(CGM)	75	....
Elk Horn Coal, Com	(EH)	41½	42
Elk Horn Coal, Pfd	(EH)	46	48½
Island Creek Coal, Com	(ICR)	39	....
Island Creek Coal, Pfd	(ICR)	75	....
Jefferson & Clearfield Coal & Iron, Pfd	(JF)	63	....
New Central Coal of West Va	(NCC)	5	....
Pittsburgh Coal, Com	(PC)	72¾	73
Pittsburgh Coal, Pfd	(PC)	95	96½
Pond Creek Coal	(PD)	21½	21¾
Virginia Iron, Coal & Coke	(VK)	65	67

BONDS	Bid	Asked
Cahaba Coal, 1st Gtd. 6s, 1922	97	....
Clearfield Bituminous Coal, 1st 4s, Ser. A, 1940	75½	....
Colorado Fuel & Iron, Gen. 5s, 1943	90½	92
Colorado Indus. 1st Mtg. & Col. Tr. 5s, 1934	76½	79½
Consolidation Coal of Maryland, 1st Ref. 5s, 1950	87	88
Jefferson & Clearfield Coal & Iron, Sec. Mort, 5s, 1926	96	....
Lehigh Valley Coal, 1st Gtd. 5s, 1933	99½	100
Lehigh Valley Coal, Gtd. Int. Red. to 4%, 1913	79½	....
Lehigh Val. Coal & Nav. Con. S. F., 4½s, Ser. A, 1954	90	....
Pleasant Valley Coal, 1st S. F., 5s, 1928	80½	....
Pochontas Coal & Coke, Joint 4s, 1941	83½	85
Pocahontas Con. Collieries, 1st S. F. 5s, 1957	84½	87
Roch. & Pitts. Coal & Ir., Helvetia Pur. Money 5s, 1946	95	....
St. L., Rocky Mnt. & Pac. Stamped 5s, 1955	....	80½
Tenn. Coal, Iron & R.R., Gen. 5s, 1951	92½	92½
Utah Fuel, 1st Sinking Fund 5s, 1931	87	....
Victor Fuel, 1st Mtg. Sinking Fund 5s, 1953	55	70
Virginia Iron, Coal & Coke 1st 5s, 1949	85½	85½